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Original Articles

THE FRANKFORT-MANDIBULAR PLANE ANGLE IN ORTHODONTIC DIAGNOSIS, CLASSIFICATION, TREATMENT PLANNING, AND PROGNOSIS

CHARLES H. TWEED, D.D.S., TUCSON, ARIZ.

THE material presented here is the result of constant clinical observation covering a period of many years. While not unexpected, it is nevertheless gratifying to find that in the main my clinical findings, although arrived at independently, bear an extremely high degree of correlation to, and actually provide additional emphasis and concrete evidence of, the validity of the results and conclusions obtained by some of the outstanding scientific laboratory research workers in the field of orthodontics. However, many of our very able research men, after presenting their findings to us, have added to our confusion by disregarding, if not actually refuting, their own scientific investigations. I refer especially to the fact that they frequently will not or do not relate their statistical and laboratory findings to their treatment procedures. This is most unfortunate because when clinical findings and scientific research are more closely wedded, only then will many of our complex problems in orthodontics be solved—not before. Let us all remember this fact.

My clinical observations have been focused for many years on (1) the position of the mandibular incisors as related to the medullary bone of the body of the mandible—I have in the past referred to this as basal bone or dental base—and (2) the normal facial esthetics and their deviations. My observations have led me to the conviction that in all orthodontic therapy involving Class I, Class II, and bimaxillary protrusion types of malocclusion, where the growth pattern of the face is not too abnormal, the mandibular incisors must always be positioned upright on the alveolar process and over medullary bone. Furthermore, I am convinced that the normal range of variation of the inclination of the mandibular incisor teeth, as related to a plane parallel with the lower border

or base of the mandible in sagittal view, is approximately ±5°, with 90° as the norm when the incisors stand at right angles to the plane parallel with the lower border or base of the mandible, i.e., the mandibular plane.

This variation in range of the normal was accepted by me as a result of my study of individuals whom I considered to possess normal occlusion. The normal as I visualize it must have, in addition to correct occlusal relationship, all five of the other qualifications as outlined in the correct interpretation of Angle's[1] definition of the line of occlusion. The possessor of all six of the fundamental requisites for normal occlusion as outlined by Angle must have a facial growth pattern normal in its entirety.

In my opinion, a thorough concept of the normal growth pattern of the child's face or any face is as important to orthodontists, if not more so, as complete mastery of the science of occlusion. Occlusion and facial esthetics, whether normal or abnormal, are so intimately associated and interdependent one upon the other that orthodontics must embrace both equally, because they cannot be dissociated. This thought was originally expressed by Angle. The man unable to correlate normal occlusion with the normal growth pattern of the face is indeed a sorry orthodontist. Let us settle the argument now and forever that it is possible to overemphasize facial esthetics in orthodontics. Normal occlusion in its correct sense is impossible without a normal facial pattern, and a normal facial pattern is none other than the ultimate in balance and harmony of facial esthetics.[2]

I might state here, but shall have more to say on the subject later, that the ±5° normal range of variation in the inclination of the mandibular incisors, as related to the plane formed by the lower border or base of the mandible, applies to those cases only in which growth has approximated the general normal pattern of the individual.[3] It applies also to all those cases where lack of osseous growth has been general and has resulted in a slightly diminished structure of the bones of the maxilla and mandible, without markedly disturbing the directional growth of the jaws. In these cases a discrepancy often can be observed between the mesiodistal configuration of the dental arch and the tooth-bearing bones of the jaws, resulting in crowding and displacement of teeth, and giving the general appearance of too much tooth material for the available bone in which the teeth are to be accommodated. If this condition is pronounced, it becomes necessary to reduce the mesiodistal dimension of the dental arch in order to obtain both normal tooth-bony base relationship and normal facial esthetics.

The foregoing does not apply to true Class III cases or to those cases where lack of growth in the condylar growth centers has perverted the growth pattern vector from the normal downward and forward direction to too much downward and not enough forward. The lack of growth in these growth centers which causes these abnormalities is, in my opinion, more common than most of us realize. We are prone to dismiss this deformity from our problems by calling it type. Perhaps half of all our problem cases fall into this category in varying degree. In its more pronounced forms it is a condition for which the orthodontist can do little as far as facial esthetics are concerned. We shall discuss these cases more fully later.

Broadbent,[4] Brodie,[5] Margolis,[6] and others have made splendid contributions on the growth and development of the head and face of the child. Brodie has demonstrated the angular constancy of the lower border or base of the mandible. By that, I mean he has shown that the plane of the lower border of the mandible when related to any fixed point, and the gonion angle when related to any constant plane, always remain virtually the same. In other words, growth is of such a nature that the planes formed by the base of the mandible at various ages from 3 months upward are always approximately parallel to one another.[5]

The parallel growth of the lower border or base of the mandible is due to its angular constancy and is quite obvious to all who have studied facial growth. Margolis[7] deserves credit for being the first to relate the axial inclination of the central mandibular incisor with the sagittal plane tangent to the most dependent points on the lower border or base of the mandible. He has named the angle formed by the interception of the long axes of the mandibular incisors with the plane formed by the lower border of the mandible, the incisor mandibular plane angle. Margolis[8] also calls attention to the fact that the philosophy which calls for distal movement of the denture, in certain cases of malocclusion, and the maintenance of the denture in normal relation to the rest of the head structures during orthodontic treatment, depends on the degree to which the mandibular incisors can be placed and maintained in an upright position over the medullary bone of the body of the mandible and that all of this is in accordance with evolutionary tendencies of facial growth.*

As stated by Margolis:[8] "Up to this point (Figs. 1 to 6), it seems quite evident that there has been a reduction in the alveolar bone in man as compared with anthropoids and primitive man, so that in modern man a chin has developed. The chin is not so much a forward development of the mental eminence but rather the result of a recession of the alveolar bone. It becomes obvious then, that the mandibular incisors have been straightened upward during the process of evolution or better, during the reduction of the alveolar bone and the formation of the chin."

In spite of this conclusive evidence, I find some highly regarded scientific workers in the field of orthodontics who contend actually that it is good clinical procedure to reverse evolutionary trends in the orthodontic treatment of our patients and to make X in Fig. 9 look like IX.

As man fulfills his evolutionary destiny we find the cranium becoming increasingly larger and the face correspondingly smaller in their relative proportions to each other in the skull. While this is going on, the mandibular incisors are becoming less procumbent. Mandibular prominence is developing in direct ratio to the diminishing degree of the procumbency of the mandibular incisors. The more procumbent the mandibular incisors, the less the mandibular prominence, and, inversely, the more upright the mandibular incisors as related to the lower border of the mandible on the sagittal plane, the more pronounced the mandibular prominence, or chin.

The acceptance of the premise that in normal occlusion the mandibular incisors are always upright over medullary or basal bone certainly adds to the

*I am indebted to Dr. Margolis for the use of Figs. 1 to 13 which he has loaned me to demonstrate our views.

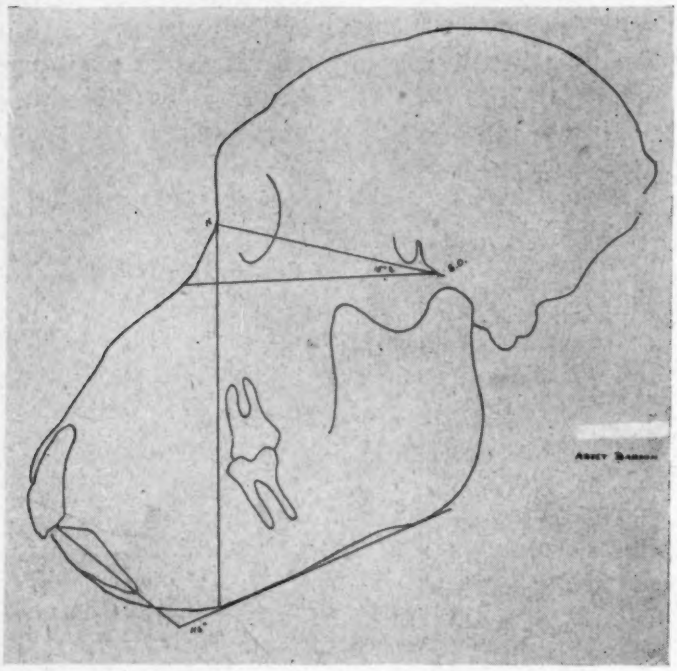


Fig. 1.—An adult baboon. Note the skull and face proportions and the high degree of prognathism.

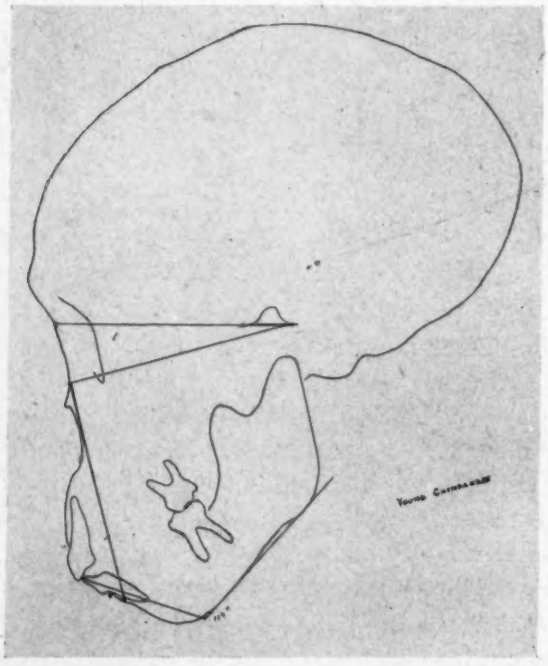


Fig. 2.—A young chimpanzee. Note similarities to Fig. 1 and compare with Figs. 3, 4, 5, and 6.

complication of orthodontic treatment. Distal en masse movement of teeth is always more difficult than mesial en masse movements. I find it most difficult to accomplish distal en masse tooth movement when there is insufficient osseous structure into which to move the teeth. Those who wear size 12 shoes and have ever tried to get their feet into size 8 shoes will know what I mean.

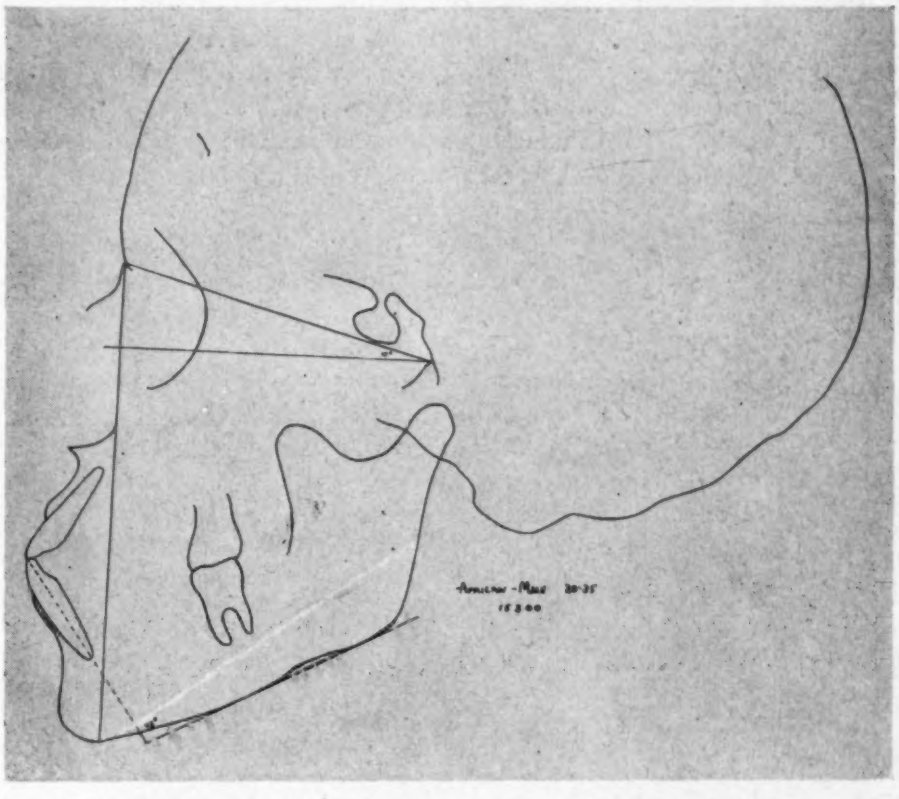


Fig. 3.—An African adult male, the tooth-bearing bones carrying the incisors, while greatly reduced in their anterior development, are still prognathous when compared to the anthropoid.

Occasionally a discrepancy can be observed between the tooth pattern and the tooth-bearing portions of the jawbones which is of such a nature that the mesiodistal configuration of the dental arch is too small in proportion to the bony base. In these cases we find spacing between the teeth. Irregularly arranged teeth and/or bimaxillary protrusion in such cases are rarely observed. The reason is that there is ample bony base to allow all the teeth to arrange themselves in accordance with the functional demands of normal denture mechanics.

When the tooth pattern-bony base discrepancy is reversed and the bone is too small in proportion to the tooth pattern, with the bony base insufficient to accommodate the teeth in normal occlusion, we find either Class I malocclusion when the facial musculature is normal, or bimaxillary protrusion if the musculature among other causes is abnormal. Irregularly arranged teeth then are frequently a manifestation of a discrepancy between tooth pattern and basal bone, as pointed out by Salzmann.[9] Failure in growth of the basal bones occurs for various reasons, which may be apparent or obscure, and malocclusion results.

The dentition itself can remain quite stable once it reaches a state in malocclusion in which the forces originally responsible for the initiation of the malocclusion became neutralized. The proof of this statement can be found in the fact that, as a rule, the condition of malocclusion in the examples referred to in the foregoing do not become progressively worse, once a state of balance in the forces responsible for the malocclusion has been reached. The functional balance, although manifestly existing in a state of malocclusion, resists change. The irregular dentition in balance is, therefore, a far more stable condition than the same dentition treated orthodontically but forced out of balance and into protrusive relationship to the medullary portion of the bony base. Such orthodontic treatment is usually followed by "collapse."

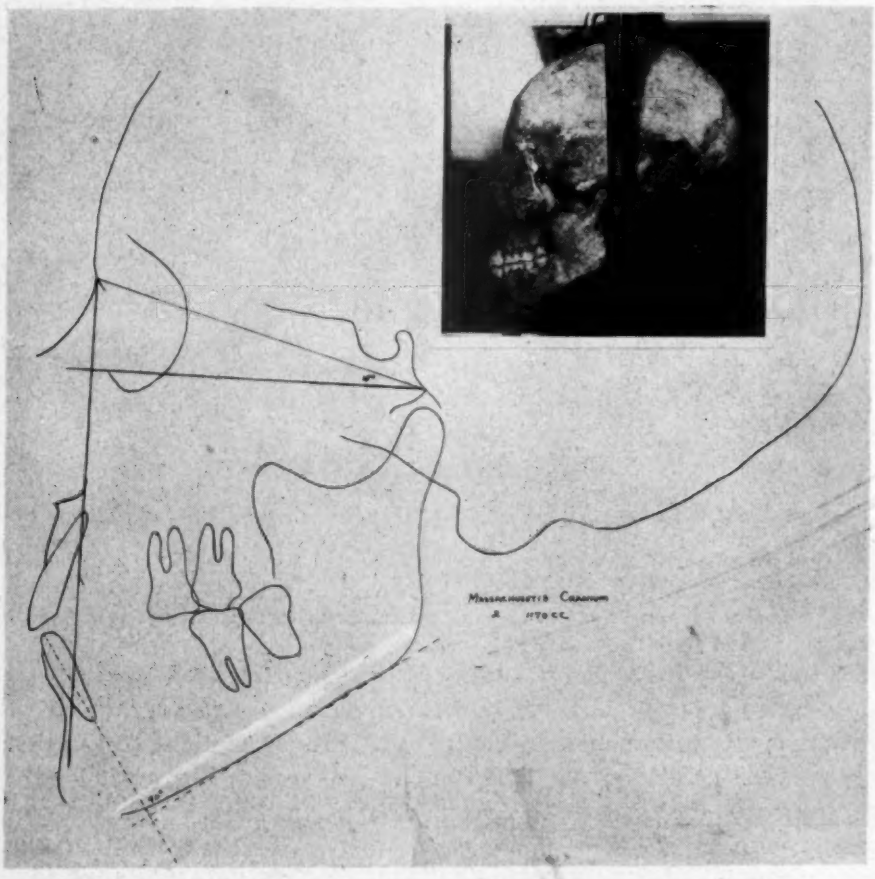


Fig. 4.—A nonprognathous Massachusetts Indian.

Facial esthetics are better with a dentition in balance, regardless of the degree of the irregularity of arrangement of the teeth, than when the irregularities are corrected at the expense of loss of dental balance. When the bony base is deficient and the dentition cannot be maintained in a state of balance by distal en masse movement of both maxillary and mandibular teeth, and in the majority of cases this is impossible, it is my practice to reduce the number of the dental units to be accommodated, rather than to create a state of imbalance with subsequent "collapse."

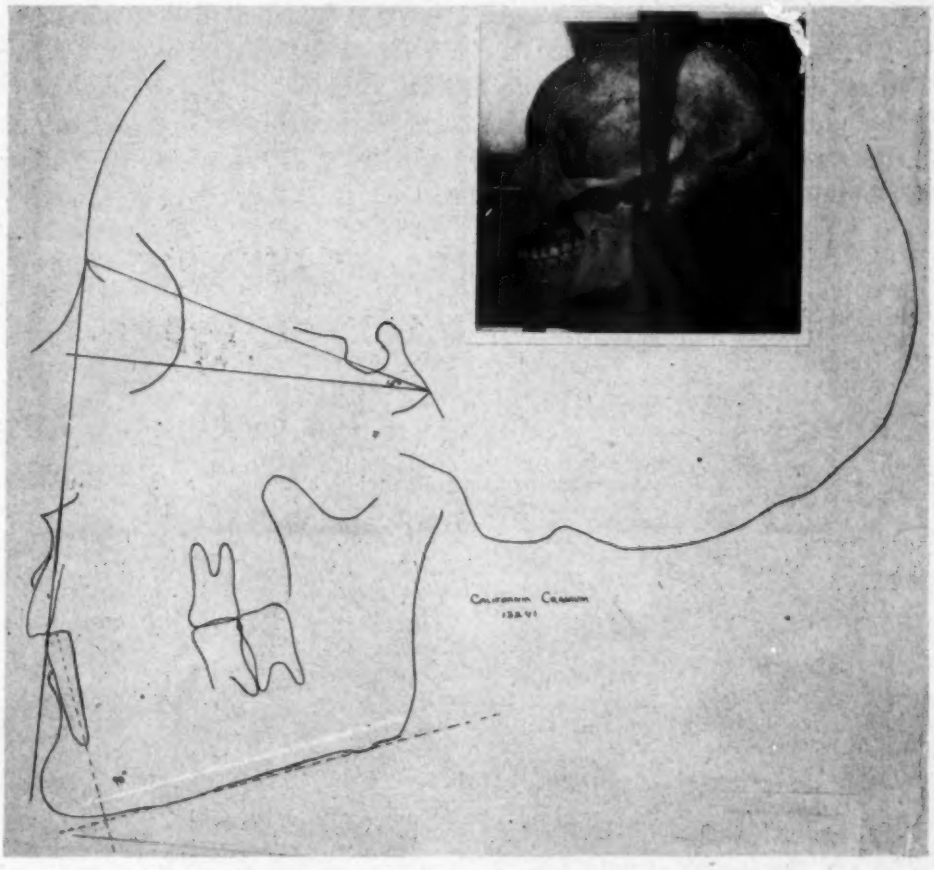


Fig. 5.—A nonprognathous California Indian with the mandible slightly more receded than in the Massachusetts skull.

Fig. 6.—A composite x-ray photograph of a beautiful profile, certainly not prognathous, where the incisor mandibular plane angle is 89.5°, or − ½° in the ±5° formula.

As a general rule, teeth are irregular for the same reason that third molars are so often impacted. The reason is, I repeat, that there exists a discrepancy between tooth pattern and basal bone because of a lack of osseous growth over which the orthodontist has no control. Until we recognize and accept this fact, treatment planning will remain obscure and results of treatment will continue to be as indifferent in the future as they so frequently have been in the past.

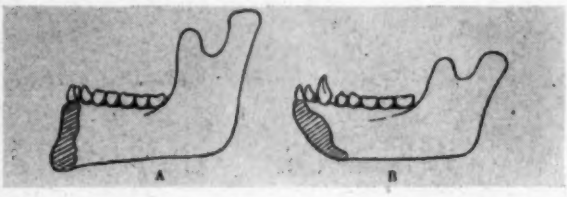
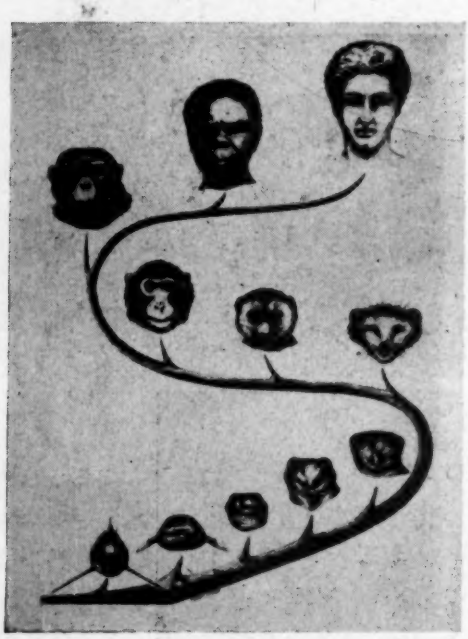
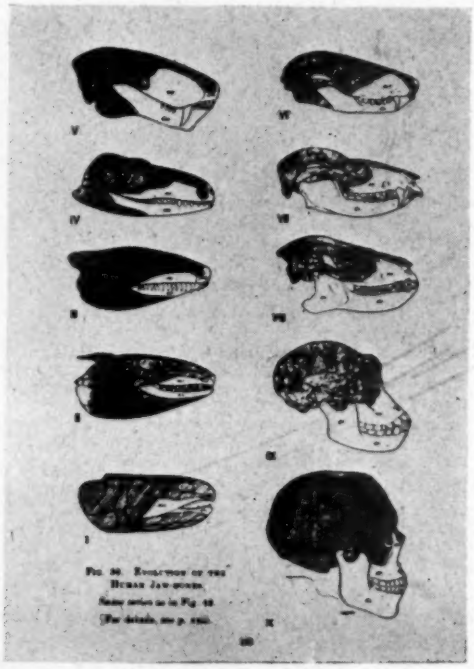


Fig. 7.—A sagittal section of the jaws of the mandible of man and monkey. Note the uprighting of the mandibular incisors in man. (From *Arboreal Man* by F. W. Jones, London, 1926, Edward Arnold & Co.)





Figs. 8 and 9.—Further examples of the reduction of the alveolar bone, the development of the chin and, last but not least, the uprighting of the mandibular incisors. (From *Our Face From Fish to Man*, by W. K. Gregory, Knickerbocker Press, G. P. Putnam's Sons, 1929.)

Let us briefly review some of the more recent research findings on tooth and jaw growth. Schour and Massler[10] have demonstrated that after the third year adverse environment cannot influence the size of the teeth. They tell us that the pattern is fixed. Schour[11] has demonstrated the rate of bone growth during normal health. There are indications that during periods of severe childhood illness, normal growth process can be retarded or stopped, to be resumed again only with the recovery of health. It is further indicated that such losses in bone growth may never be regained by the individual at any later date.[12] Something in growth is lost forever, and the individual never attains the optimum in os-

seous growth intended by his genetic pattern. Broadbent[13] concurs in this opinion.

When we consider that the size of the tooth pattern, after the third year, cannot be influenced by adverse health conditions, but that illness can, and does, affect osseous growth between the third and twenty-first years, it becomes quite apparent that there could be, and probably are, discrepancies between tooth pattern and the tooth-bearing bones of the jaws in the majority of cases that come to us for treatment.

Fig. 10. Fig. 11.

Figs. 10 and 11.—Margolis' concept of the correct application of this principle in correct orthodontic treatment. Fig. 10, Before treatment. Fig. 11, After treatment.

Then, too, there is the widely accepted possibility that man is in one of the acute transitional periods of his evolution. The cranium is increasing in size in its proportion to the face.[14] The face bones are becoming smaller. The teeth are becoming less and less procumbent and all spacing between them has closed. Man is the only animal, to my knowledge, which normally does not have some spacing between the teeth. Man frequently shows failure of some of his teeth to develop. It has been pointed out that man is in a transitional period of his evolution in which a reduction in the number of his teeth is in process. When the transition is complete and the accepted formula is twenty-eight teeth, or less,[15] perhaps the tooth-bone discrepancy problem will vanish, at least temporarily.

Regardless of the etiology, the fact remains that all too often the orthodontist is faced with the problem of a discrepancy between tooth pattern and medullary or basal bone. And what is even more regrettable is the fact that most orthodontists either fail to recognize the condition or refuse to do anything about it in their treatment procedures.

Brodie, in his paper, "Some Recent Observations on the Growth of the Mandible,"[16] indicates that it is impossible to make tooth-bearing bones grow by means of orthodontic appliances.

Brash, working in England, Schour and his co-workers,[17] and Brodie,[19] in Chicago, both groups using alizarine dye injections on monkeys, gave us valuable information as to where and when growth in the mandible takes place, and where and when it does not. They found growth to be general throughout the entire body of the mandible until the eruption of the first permanent molars. Thereafter, growth was restricted to the posterior borders of the rami, the alveolar process, the border of the sigmoid notch, and the head of the condyle. The mandible grows forward by additions to the posterior borders of the rami, while some resorption of the anterior borders (now questioned by anatomists) maintains the pattern of the bone. Vertical growth is confined to additions to the alveolar process and the upward growth of the heads of the condyles against a plane that is descending. This forces the mandible downward. The condyles are apparently the growth centers that retain their activity the longest, for they must act as the compensating factors that take care of all the vertical growth processes of both mandible and maxilla.

Since generalized growth throughout the body of the mandible ceases with the eruption of the first permanent molars and is thereafter restricted to the areas mentioned above, and, as Brodie has shown us, we cannot make the body of the jawbone grow with orthodontic appliances, what are we to do when we are confronted by a patient in our dental chair, about 12 years of age, with blocked-out canines or premolars or enlocked lateral incisors. Just what should we do under these circumstances?

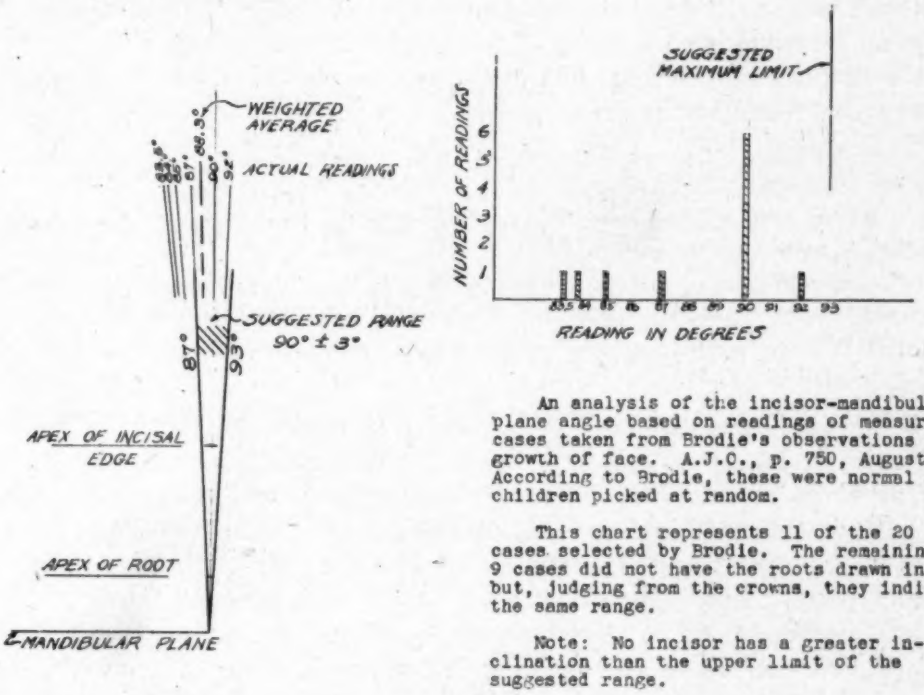
Let us review this picture carefully. We have our patient, aged 12 years, in the chair. He has high canines or premolars blocked out, or enlocked lateral incisors. We cannot move the teeth back because Brodie has shown that it is impossible to make basal bone grow. Brodie,[18] and Schour and his co-workers[17] agree that generalized growth of the body of the mandible is over by the time our patient reaches 12 years of age. Whatever growth may occur at this age is restricted to areas other than the canine or lateral incisor region. There is no chance, therefore, of moving these teeth posteriorly in the buccal segments. Shall we try to reverse evolutionary trends and "round out" the arches by positioning the incisor teeth off the medullary bone, producing a uni- or bimaxillary protrusion which is usually followed by "collapse"?

Tweed[2] says the mandibular incisors should always be positioned upright over the medullary bone of the jaw because all normals are that way. The growth studies of both Brodie and Broadbent substantiate Tweed's contention, even though Brodie states he does not agree.

In the August, 1944, issue of the AMERICAN JOURNAL OF ORTHODONTICS AND ORAL SURGERY, I stated the following:

> For years I have contended that in normal occlusion the mandibular incisors are always positioned in an upright position on mandibular basal bone; that normals do present a variation in the axial inclination of the mandibular incisors but that this variation falls within the ±5° range, 0° being vertical and upright.

To the best of my knowledge, Dr. H. Margolis was the first to relate the mandibular incisors to the mandibular plane to create what he has termed the "Incisor Mandibular Plane Angle." He further found that in most white children with normal dentitions and nonprognathous faces, the mandibular incisors were at right angles to the mandibular plane and therefore the incisor mandibular plane was 90 degrees and the variation was less than 5 degrees either way in 90 per cent of the 300 children examined. Any variation from the right angle in this type face being toward the minus.[3, 7]



An analysis of the incisor-mandibular plane angle based on readings of measurable cases taken from Brodie's observations on growth of face. A.J.O., p. 750, August 1940 According to Brodie, these were normal male children picked at random.

This chart represents 11 of the 20 cases selected by Brodie. The remaining 9 cases did not have the roots drawn in; but, judging from the crowns, they indicate the same range.

Note: No incisor has a greater inclination than the upper limit of the suggested range.

Fig. 12.

In the August, 1940, issue of the AMERICAN JOURNAL OF ORTHODONTICS AND ORAL SURGERY, there appeared an article by Allan G. Brodie, "Some Recent Observations on the Growth of the Face and Their Implications to the Orthodontist."[19] The basis of his report was the records of twenty-one normal children who were selected at random—on the basis of excellence of roentgenograms—eleven in the three-month to seven-year range and ten in the six-month to eight-year range. Each series of roentgenograms consisted of fourteen sets of headplates taken quarterly during the first year of life, semiannually from 1 to 5 years, and annually from then on. All were males. On page 750, Fig. 8, of the article by Brodie mentioned here, are shown the growth patterns of these children. In nine of these cases in that series only the crowns were traced and not the roots, so the incisor mandibular plane angle could not be measured. In the other eleven instances the incisor mandibular plane angles are as follows:

In one case the angle is 92 degrees.
In six cases the angle is 90 degrees.
In one case the angle is 84 degrees.
In one case the angle is 87 degrees.
In one case the angle is 85 degrees.
In one case the angle is 83.5 degrees.

The angular variation of the mandibular incisors with relation to the lower border of the mandible is 8.5° in this group of normals.

The average for these eleven cases is an incisor mandibular plane angle of 88.3°, which is vertical or upright and well within the range of the ±5° formula. In fact, it is –1.8°.

In the *Angle Orthodontist,* October, 1941, page 239, Fig. 11, in B. Holly Broadbent's paper, "Ontogenic Development of Occlusion," there appears an illustration summarizing the study of normal dentofacial developmental growth from the Bolton Study records of 3,500 white Cleveland children.[20] This illustration reveals the following facts:

1. The composite, representing the children in the 3½-year bracket shows the incisor mandibular plane angle to be 90°.

2. The composite, representing the children in the 7-year bracket, shows the incisor mandibular plane angle to be 81°.

3. The composite, representing the children in the 14-year bracket (the ones we are most interested in), shows the incisor mandibular plane angle to be 87.5°.

4. The composite, representing the adults, shows the incisor mandibular plane angle to be 91.5°.

The average for these 3,500 cases is an incisor mandibular plane angle of 87.9°, which is within 0.8° of the average for the normals reported by Brodie. Again, an incisor mandibular plane angle of 87.9° is upright and nearly vertical; being so, it is obvious that in normal occlusion the mandibular incisors are upright on mandibular basal or medullary bone of the body of the mandible, as I originally pointed out. The findings of Brodie and Broadbent were arrived at independently by them. They certainly did not go out to "prove" anything. They engaged and are engaging in research in order to report the facts as they find them. It is indeed gratifying that their findings substantiate my clinical observations and conclusions, regardless of the fact that the men themselves did not correlate their findings to my clinical procedure as shown in the foregoing and in the facts presented below.

Let us come back to our patient: Our little friend is still in the chair waiting. Our patient, or at least his mother, is interested only in changing her child's "funny face" for a better appearing one and his "crooked teeth" for "straight ones" that will remain "straight." His buccal teeth cannot be moved distally according to Brodie, Schour, and many others. The mandibular incisors must not be displaced forward into protrusion, according to Tweed and many others since, who are at long last enjoying the practice of orthodontics.

There is much work to be done if we ever hope to clear up this confusion of thought and iron out correct treatment procedures. Clinical observation and research and scientific research and correlation must become brothers. Advancement in orthodontics, as in other fields of medical science, is equally dependent on both.

The import of Broadbent's contribution to orthodontics has not been fully appreciated by many of us. The advent of cephalometrics was indeed a happy day for orthodontics. The tracings of the growth studies of Broadbent, Margolis,

Brodie, Higley, Humphrey, and many others, are most enlightening. These authors point out planes, angles, curves, trends, etc. It is unfortunate that many of us look only where they point their fingers, no further, and say, "Wonderful." Most of us have again missed the boat just as we did by interpreting incorrectly Angle's definition of the "Line of Occlusion." No man, including Broadbent, I feel, has ever completely digested the information made available from his tracings. Most of us have been guilty of glancing at them only, and passing them by.

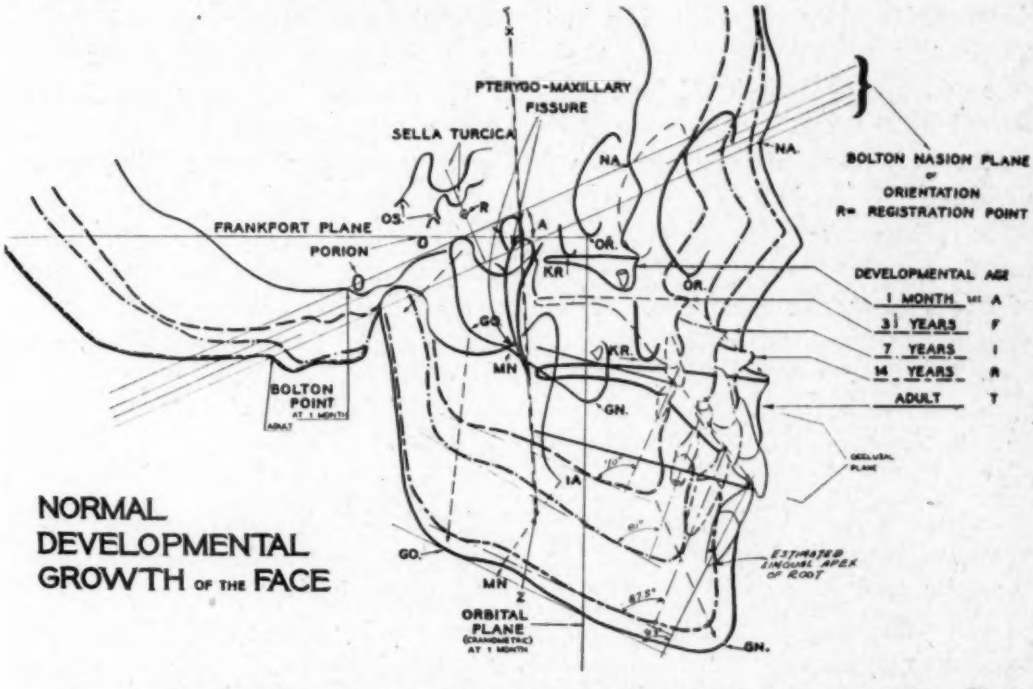


Fig. 13.—Chart of normal dentofacial developmental growth from the Bolton Study records. (Broadbent, B. Holly: Ontogenic Development of Occlusion, The Angle Orthodontist 11: 239, 1941.) (Incisor mandibular plane angle drawn in by Herbert I. Margolis.)

A recent review of these tracings, with a closer study of lateral photographs of skulls and heads of living subjects oriented on the Frankfort plane, has added further corroborative evidence of the validity of certain facts which I had arrived at by clinical study and investigation. I shall endeavor to present here a practical method of value in diagnosis, classification, treatment planning, and prognosis, which can be used in the everyday practice of orthodontics without additional expensive equipment. The procedure to be presented here employs the Frankfort plane and the plane tangent to the most dependent points on the lower border or base of the body of the mandible, i.e., the Frankfort and mandibular planes, which when extended into space meet and form the Frankfort-mandibular plane angle.

A study of the tracings made from sagittal head x-rays of normal growing children reveals certain trends that are not too difficult to understand. When one becomes familiar with the normal growth pattern, it is quite simple to compare it with the growth pattern of the abnormal and determine approximately the extent of the deviation from the normal. However, this information has in

the past been regarded as being of academic interest only. It need no longer remain so, because, as we shall show here, it has a deep and vital significance in our daily practice.

As shown in the foregoing, Brodie[19] and others have demonstrated that once the growth pattern of the facial bones is established, whether normal or abnormal, it is virtually constant and resists change. For instance, in those cases where there has been injury to the condylar growth centers that temporarily retards growth in these centers, we find short rami, and growth is diverted more downward and less forward than in the normal growth vector, which is downward and forward. This loss in the normal, proportional bone pattern is never regained by the individual by future growth spurts. This statement is supported by the fact that the parallelism of the lower borders of the mandible continues in the abnormal direction during the subsequent growth of these individuals. It is obvious to all of us that such a case is to be avoided because there is little other than correction of occlusal relationships that the orthodontist can do for these patients. Yes, we all recognize that, but I wonder how many of us realize that a great many of our problem cases are but variations of this same condition. And, because we fail to detect a faulty growth pattern, we become befuddled. Were we more observant, we would recognize these cases at once and realize that, because of the abnormal growth pattern, we shall never be able to attain all of our orthodontic objectives, regardless of how we treat the case.

A classification of prognosis* that will pick out these cases should be of great value to all of us. My purpose is to make a start in that direction, with the hope that others will consider the problem worthy of further study.

In using this diagnostic method, we can employ Salzmann's Maxillator[21] and take our measurements directly on the patient, or we may employ a sagittal head x-ray or profile photograph.†

When sagittal x-rays or photographs are used, the Frankfort plane is extended posteriorly through the back of the head. The plane formed by the lower border of the mandible is likewise extended posteriorly until it intercepts the Frankfort plane. The degree of the angle formed by the intercepting of these two planes will determine the location of the point of interception of these planes, which is somewhere distal to the auditory meatus. We shall refer to this angle as the Frankfort-mandibular plane angle when the Frankfort plane is used; the Bolton-mandibular plane angle when the Bolton plane is used. We shall use the Frankfort plane, because for our purposes it is more practical.

If the Frankfort-mandibular plane angle (these figures are at present approximations) is between 16° and 28°, the growth vector has been downward and forward to a degree which is normal. These cases will frequently have

*By "prognosis" I mean the attaining of, or as nearly as possible the attaining of, all four orthodontic objectives which, I feel, all orthodontists should strive for. These are:

1. The best possible in facial esthetics.
2. Permanency of end result.
3. An efficient masticating apparatus.
4. Longevity of the dentition.

†Add 5 to 7 degrees to the above figures when measuring on sagittal head x-rays.

normal occlusion or an osseous growth pattern of but slight deviation from normal, even though the malocclusion is of a severe nature. The orthodontist can be reasonably certain of a permanent result with excellent facial esthetics if he will reduce the tooth pattern so that it is in keeping with the osseous bulk

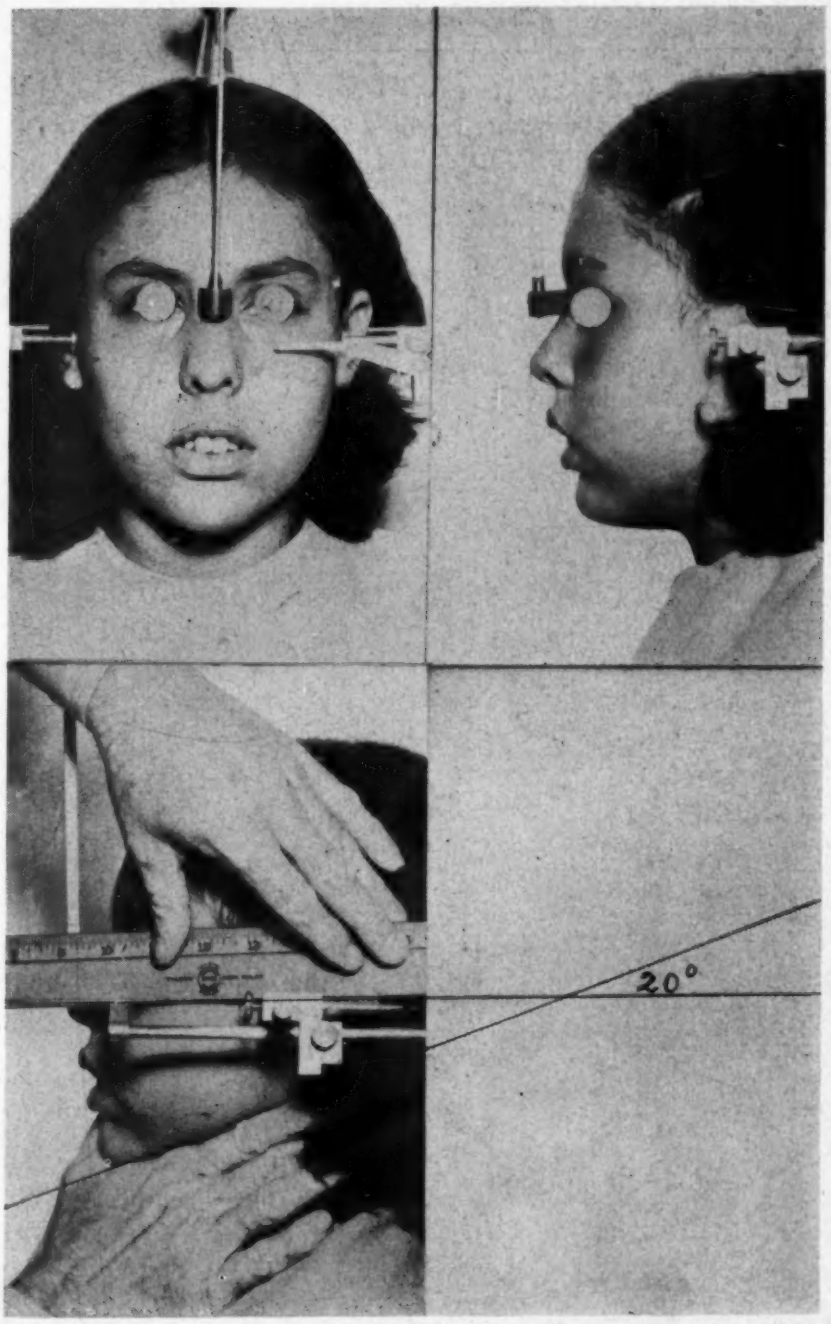


Fig. 14.—An excellent face pattern in which the Frankfort-mandibular plane angle is 20°. The case is a Class II malocclusion complicated by a discrepancy between tooth pattern and basal bone. If this discrepancy is corrected, there is no reason why all four of the orthodontic objectives cannot be attained. Prognosis is excellent.

if and when such procedure is indicated. The Frankfort and mandibular planes will intercept each other somewhere behind the head. The distance of their interception posteriorly from tragion will vary from 3½ inches to 8 inches or more, depending on the degree of the Frankfort-mandibular plane angle. The ±5° variation of the mandibular incisors will apply to all of these cases. However,

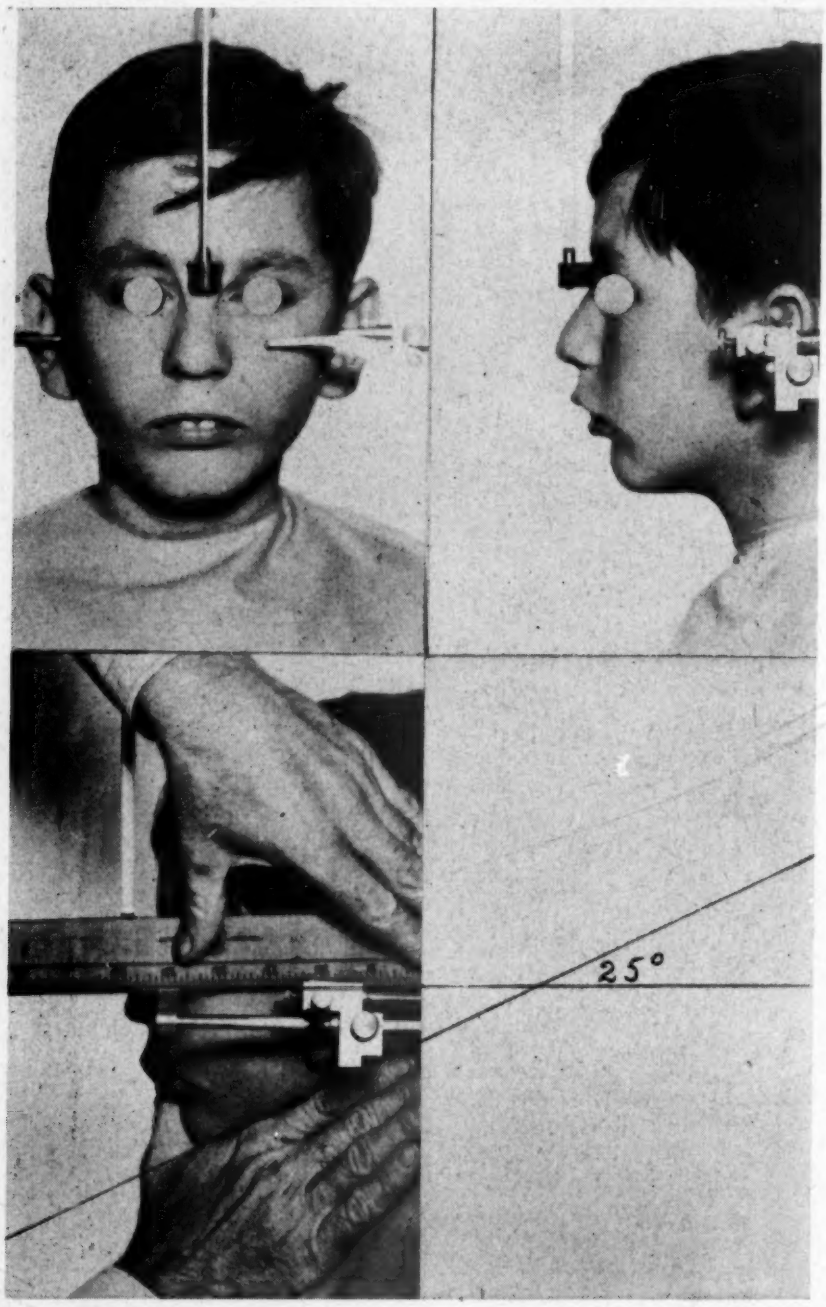


Fig. 15.—Another favorable growth pattern in which the Frankfort-mandibular plane angle is 25°. The case is a Class II, Division 1 malocclusion, complicated by a discrepancy between tooth pattern and basal bone, which requires the removal of all four first premolars. Prognosis is very good.

the +5° will apply more to those cases whose Frankfort-mandibular plane angle is nearest the 16° extreme, and 0° to those cases that fall around the Frankfort-mandibular plane angle of approximately 22°. When the Frankfort-mandibular plane angles range from 22° to 28°, the correct positions of the mandibular

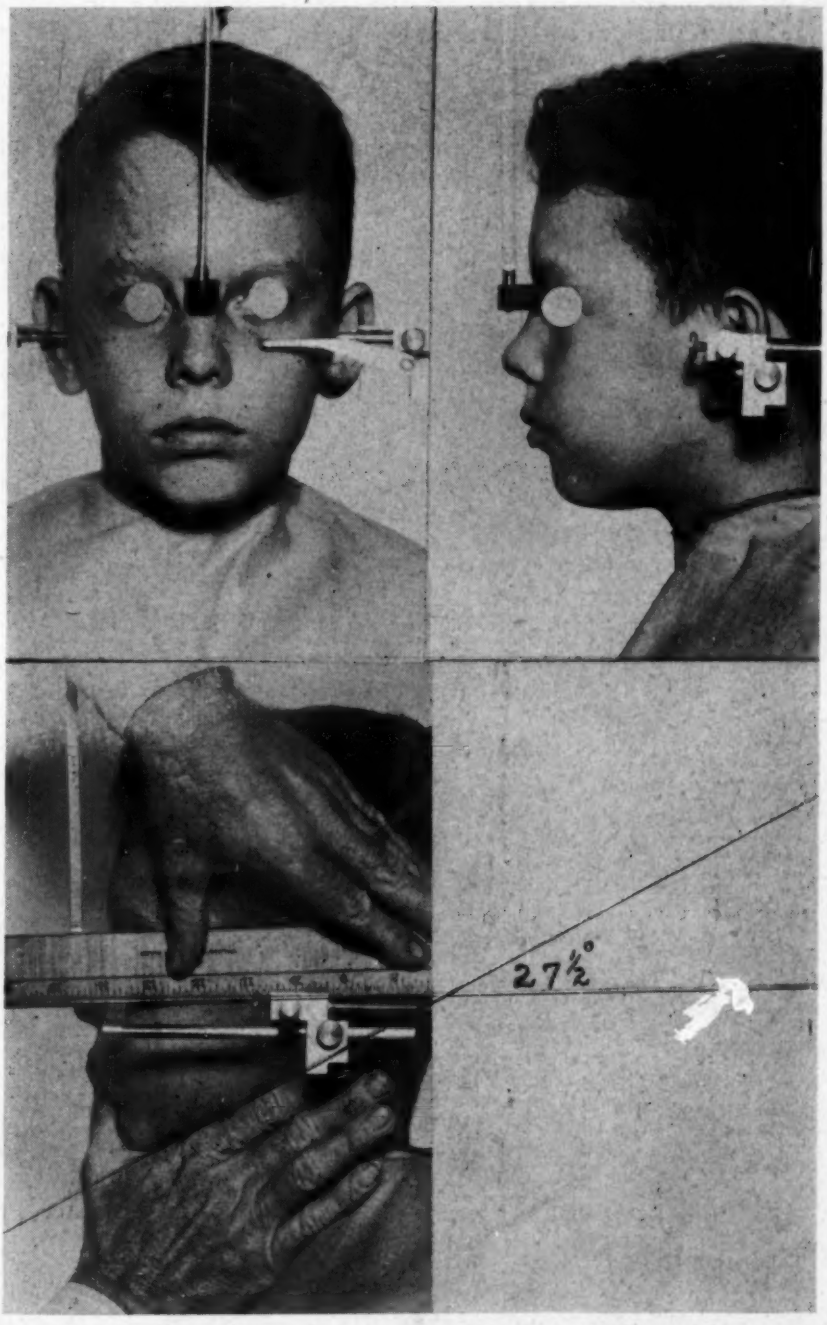


Fig. 16.—Another favorable growth pattern. The Frankfort-mandibular plane angle is 27½°. The case is a Class II, Division 1 malocclusion in which there exists a discrepancy between tooth pattern and basal bone requiring the extraction of all four first premolars. Prognosis is good.

incisors will vary from 0° when the Frankfort-mandibular plane angle is 22°, to –5° when that angle increases to 28°. My opinion is that about 60 per cent of all malocclusions will fall within a 16° to 28° range of the Frankfort-mandibular plane angle when measurements are taken from profile photographs. More than half of these cases will require reduction of tooth pattern if proportions approximating the normal are to be realized.

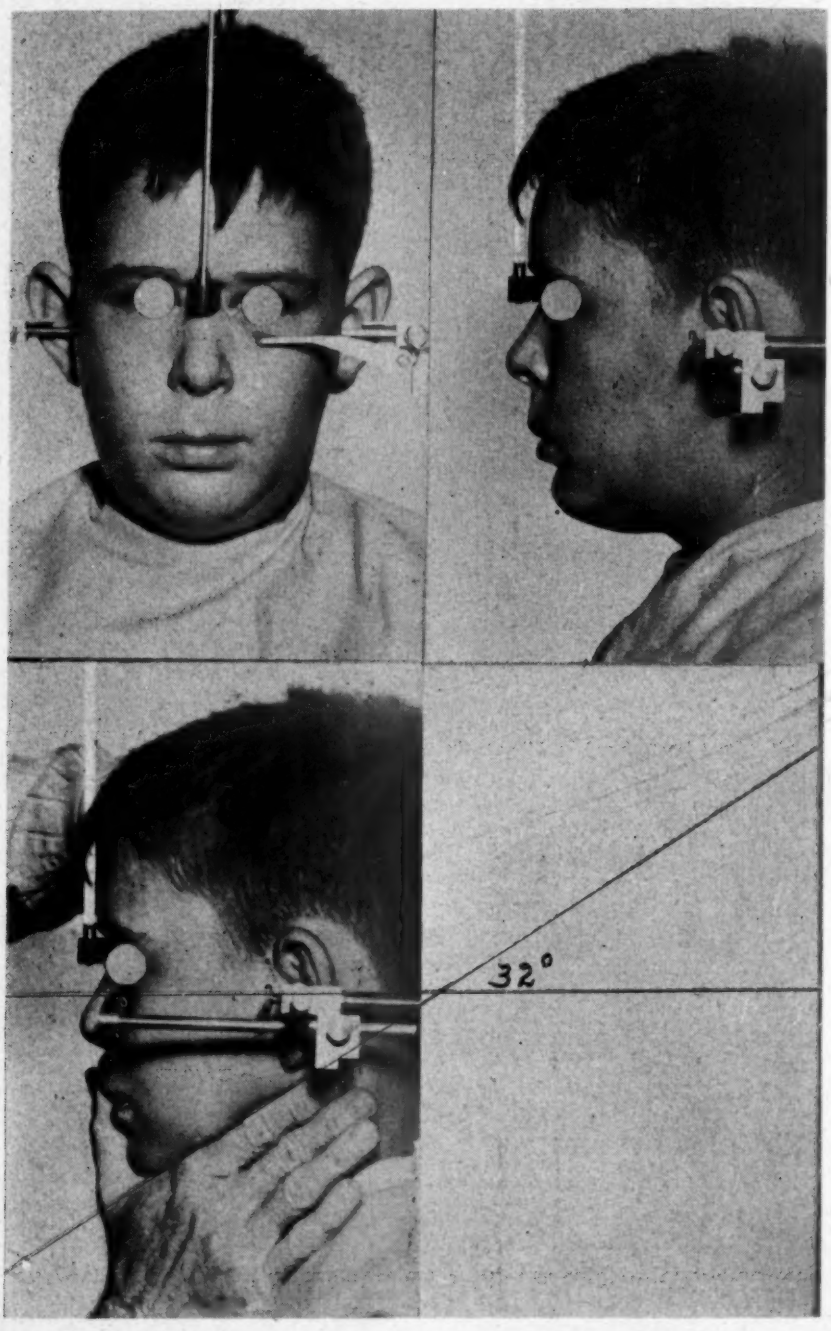


Fig. 17.—Here the directional growth of the face is only fair. The Frankfort-mandibular plane angle is 32°. A nonextraction case. Prognosis is fair.

When the Frankfort-mandibular plane angle is from 28° to 35° (measurements taken from photographs), the growth vector is not so favorable. Cases in the angular classification that fall nearest the 28° extreme can be, in most instances, satisfactorily treated with favorable changes in both facial esthetics and occlusal relationship. The growth vector is not too abnormal and the ±5°

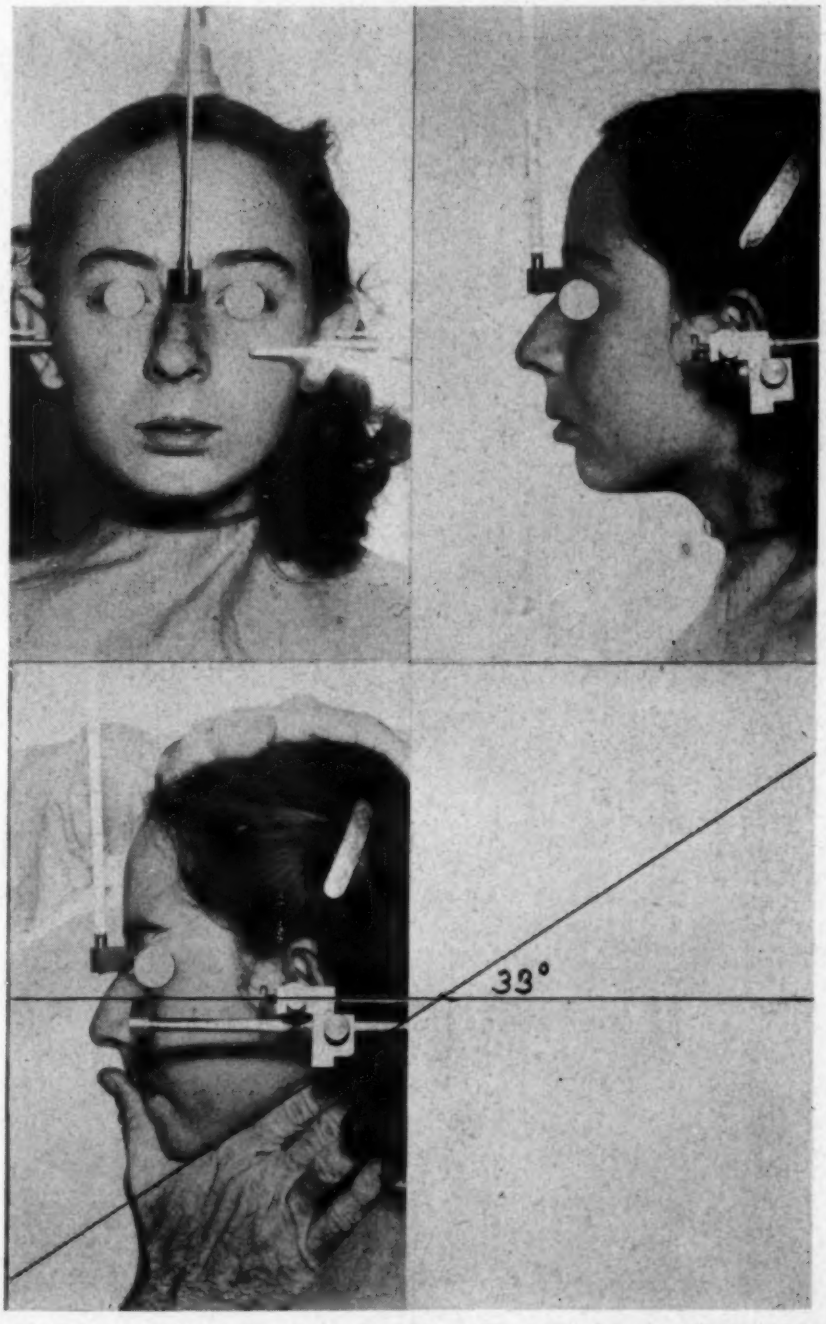


Fig. 18.—The face pattern is not too favorable. The Frankfort-mandibular plane angle is 33°. The case is a Class II, Division 1 malocclusion, complicated by a discrepancy between tooth pattern and basal bone requiring the extraction of all four first premolars. Prognosis is fair.

formula can be applied, but it will be found that the inclination of the mandibular incisors must fall near the –5° extreme. Prognosis is good. A larger percentage of these cases will require extraction of teeth, as procumbent tendencies are more pronounced. When the Frankfort-mandibular plane angle approaches

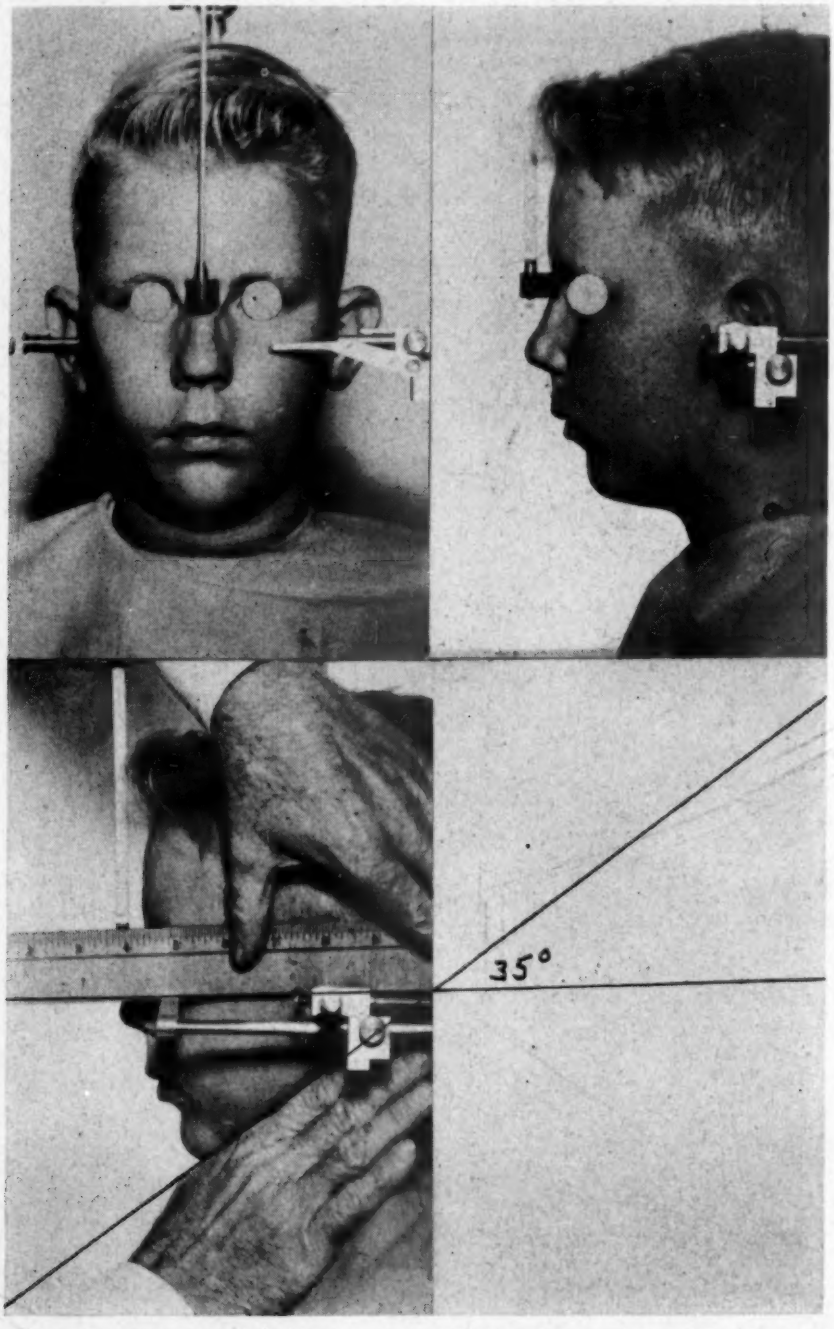


Fig. 19.—This case presents a Frankfort-mandibular plane angle of 35°, which would indicate that the directional growth of the face pattern is bad. The case is complicated by a discrepancy between tooth pattern and basal bone requiring the removal of all four first premolars. From the standpoint of obtaining all four orthodontic objectives, prognosis is bad.

nearer to the 35° extreme, prognosis is only fair, and favorable prognosis diminishes in direct ratio to the increase in degree of the Frankfort-mandibular plane angle. The ±5° formula cannot be applied to these cases because the mandibular incisors must be positioned from –5° to –10°.

When the Frankfort-mandibular plane angle is much greater than 35°, few of these cases can be appreciably benefited by orthodontic treatment. Prognosis is bad. Virtually all cases showing a Frankfort-mandibular plane angle of from 28° to 35° will require removal of teeth. When the Frankfort-mandibular plane angle is from 30° upward, the ±5° formula will not apply.

Fig. 20.—Here the directional growth of the face pattern is chaotic. The Frankfort-mandibular plane angle is approximately 41° and prognosis is virtually nil. The extraction of teeth in this instance would perhaps complicate matters rather than enhance facial esthetics.

As the Frankfort-mandibular plane angle increases from 35° upward, favorable prognosis is nil. In some instances the removal of teeth in this range (when the Frankfort-mandibular plane angle is 40° or more) will complicate matters and detract from, rather than enhance, facial esthetics. The growth pattern in this category is so perverted that the vector of growth is virtually downward and but slightly forward, rather than downward and forward. As the Frankfort-mandibular plane angle increases in degree, it approaches the tragion point more closely.

To Summarize.—

1. In cases that fall within the Frankfort-mandibular plane angle range of 16° to 28°, the prognosis varies from excellent for those nearest the 16° extreme to good for those cases nearest the 28° extreme.

2. In cases that fall within the Frankfort-mandibular plane angle range of 28° to 32°, the prognosis will vary from good at 28° to fair at the 32° extreme.

3. In cases that fall within the Frankfort-mandibular plane angle range of 32° to 35°, the prognosis is fair at 32° and not favorable at 35°.

4. In cases that fall within the Frankfort-mandibular plane angle range of 35° upward, prognosis is not favorable at 35° and virtually nil at extremes such as 45° to 55°.

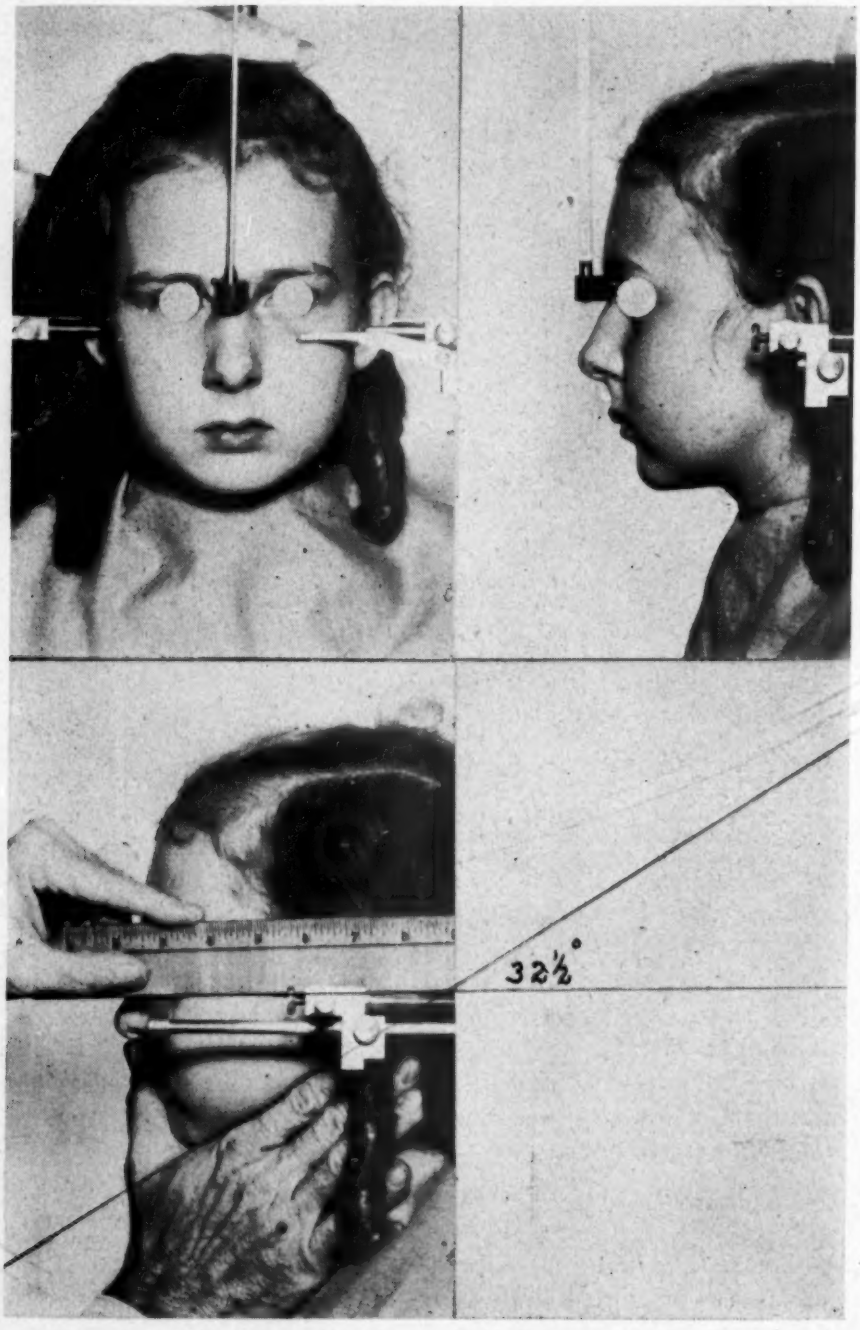


Fig. 21.—Method of obtaining Frankfort-mandibular plane angle.

Procedures for Obtaining the Frankfort-Mandibular Plane Angle.—In actual practice on the patient, the Frankfort-mandibular plane angle can be obtained by means of the Salzmann Maxillator or by the following method:

The fingers and thumb of the right hand are extended, palm down. The fingers are kept together while the thumb extends from the palm of the hand at approximately a 90-degree angle from the fingers. The thumb is placed in the area at subnasion on the patient, and gnathion, or the chin, will rest in the angle of the hand formed by the thumb and palm (Fig. 21). A slight upward pressure of the hand with the fingers extended under the lower border of the mandible to gonion will clearly outline the lower border. With the left hand place a rule lightly against the patient's face, connecting orbitale and tragion. Have the rule extend posteriorly beyond tragion at least 6 or 8 inches. The assistant now places another rule along the line formed by the palm and upper border of the index finger with the lower border of the mandible. The Frankfort-mandibular plane angle will be formed at the intersection of the two rules.

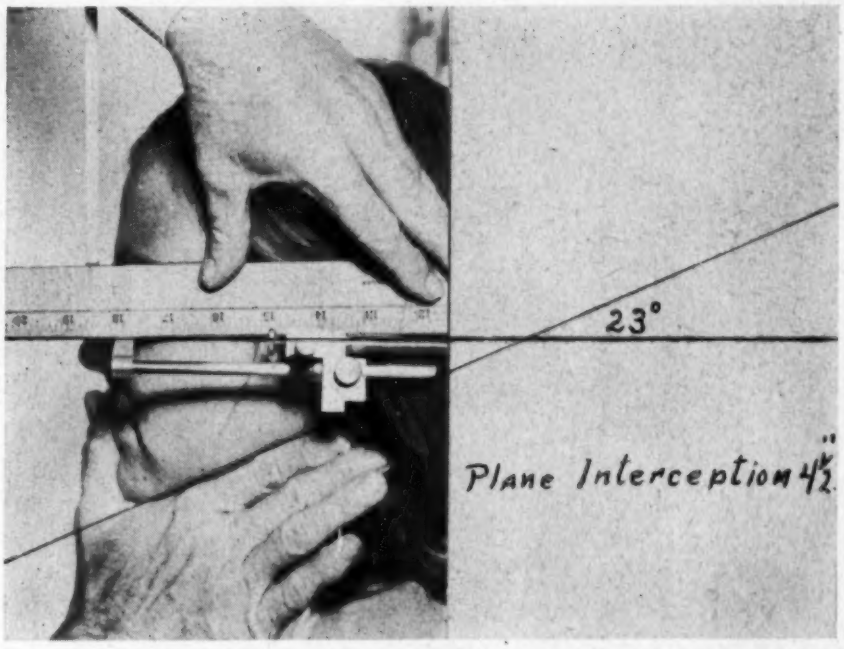


Fig. 22.—Frankfort-mandibular plane angle is 4½ inches posterior to tragion.

If the Frankfort-mandibular plane angle lies from 3½ to 10 inches posterior to tragion, the growth pattern is normal, or at least favorable, and prognosis is good. This does not mean that extracting of teeth is not indicated. The ±5° formula applies to these cases. Prognosis increases from good, when the Frankfort-mandibular plane angle lies 4 inches posterior to tragion, to excellent when it lies 8 or more inches from that point (Fig. 22).

When the Frankfort-mandibular plane angle lies from 1½ to 3½ inches posterior to tragion, the growth pattern has not been so favorable. Prognosis decreases from good, when the Frankfort-mandibular plane angle lies 3½ inches posterior to tragion, to poor when that angle lies at 2 inches. More and more extracting will be necessary in this group. The ±5° formula will apply to those cases nearest the 3½ inch extreme and the mandibular incisors will approach the –5° extreme of the + or –5° formula, but the formula will not apply to

those cases nearest the 1½ inch extreme. It becomes quite apparent, because of the angular variation of the lower border of the mandible, that it would be much better and more simple to relate the inclinations of the mandibular incisors to either the Frankfort or Bolton plane rather than the lower border of the mandible. The reason is that the ±5° formula can be applied to the lower border only when the face pattern is normal or nearly so.

When the Frankfort-mandibular plane angle falls closer than 1½ inches posterior to tragion, the growth pattern is so abnormal that there is little the orthodontist can do for these sled-runners and Class III's.

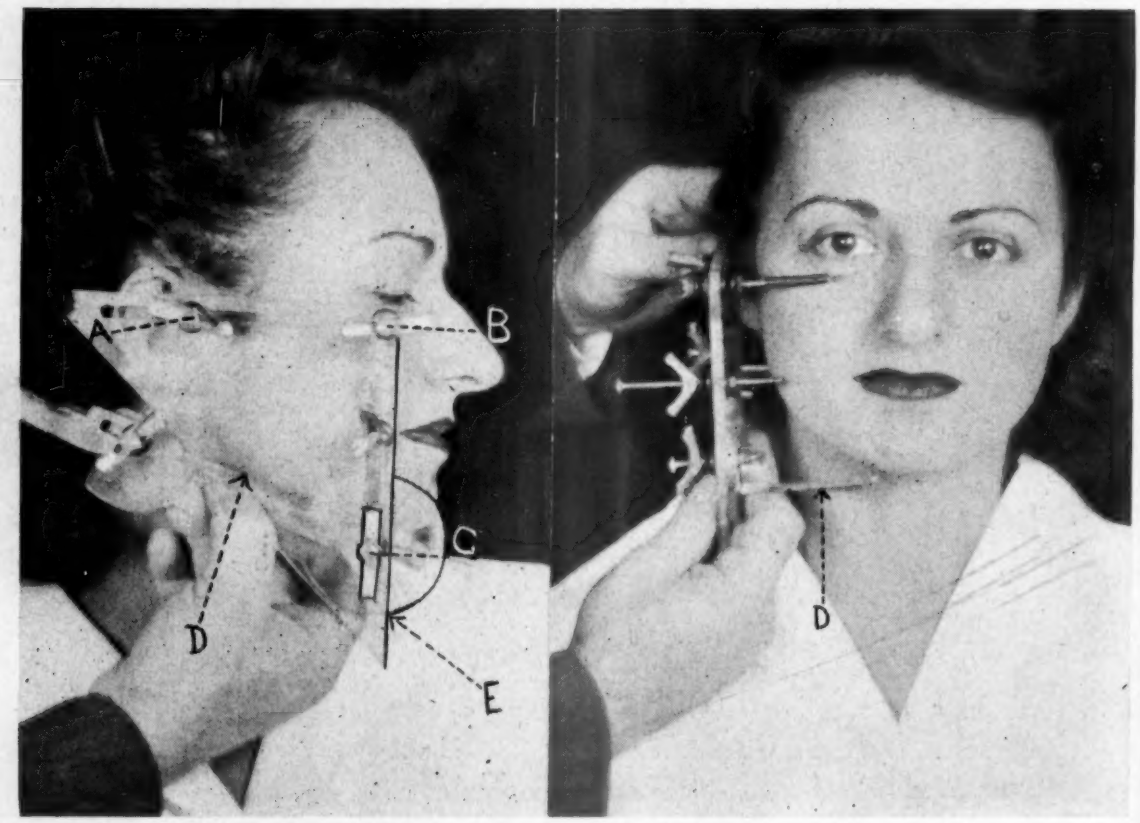


Fig. 23.—The Salzmann Maxillator. Left *A*, Tragion point screw; *B*, orbital point screw; *C*, screw in vertical slot used to adjust the Mandibular Base Piece *D*, against the base of the mandible. Photograph on right shows front view of maxillator applied to face of patient. *D* indicates Mandibular Base Piece against base of mandible. (Courtesy Dr. J. A. Salzmann.)

If Salzmann's Maxillator[21] is used, the Frankfort-mandibular base angle is obtained by direct measurement on the head of the patient and read on the right-hand side protractor on the mandibular base piece. This gives the reading without resorting to the foregoing method or to profile roentgenograms or photographs.

To obtain the Frankfort-mandibular plane angle with the Salzmann Maxillator, the patient is seated upright with the head on a line with the torso.

Place the Maxillator with screw assemblies *A* and *B* (see Fig. 23) at the tragion and orbital points, respectively. Sight along the vertical millimeter scale for the length of the face at the orbital plane. Adjust screw assembly *C* to this point. Adjust the Mandibular

Base Piece *D* so that it lies flat and is pressed against the lower border of the mandible, while screw assemblies *A* and *B* are maintained at their respective points on the face, indicating the Frankfort plane.

The Frankfort-mandibular plane angle is the angle formed by the Frankfort plane and the plane tangent to the base of the body of the mandible and is shown on the Maxillator on the protractor at the bottom of the circumference of the circle on the right side of the Mandibular Base Piece, *E*, where the latter is crossed by the edge of the vertical 6-inch side of the Maxillator.

The illustrations shown in Figs. 24 to 45 present additional evidence in confirmation of the philosophy and method of procedure set forth in this paper.

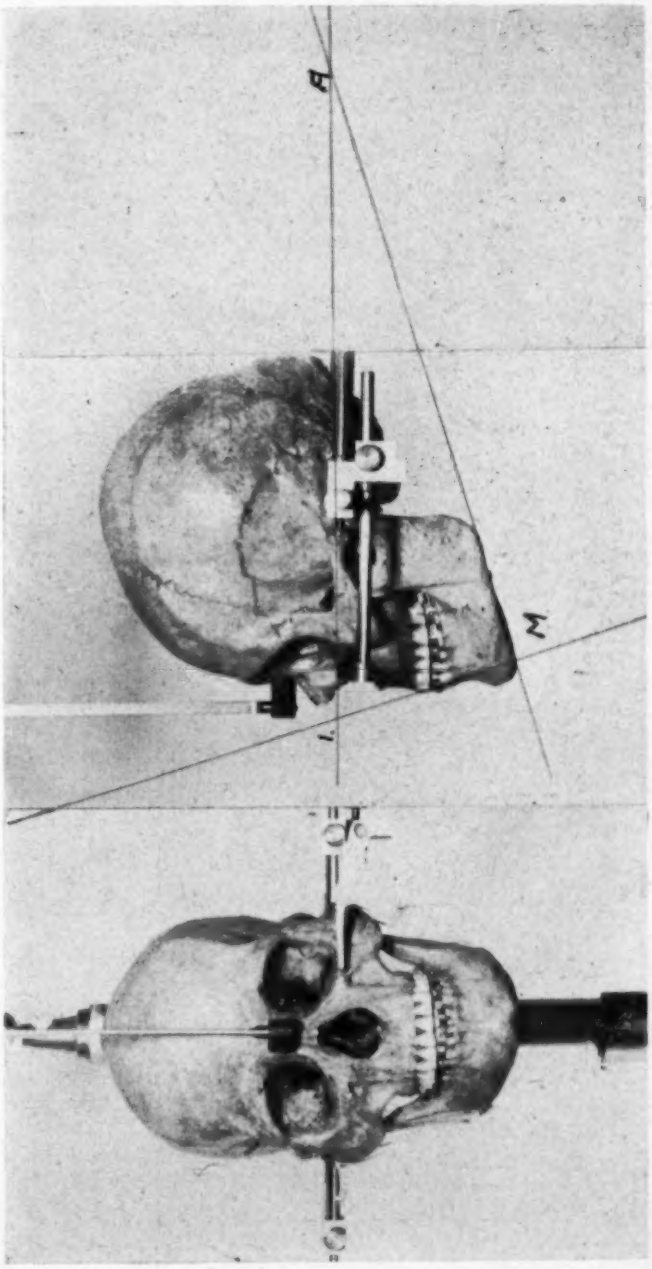


Fig. 24.—A skull of an Arizona Indian with a close approach to normal occlusion. The directional growth of the face is splendid and the Frankfort-mandibular plane angle is 16°. By erecting a perpendicular line from the lower border of the mandible through the long axis of the mandibular central incisor, it will be seen that this line intercepts the Frankfort plane in such a manner that the angle *M I A* is formed. This angle is 73° and I feel that by calling the 73° angle the norm, it would perhaps be easier to relate the inclinations of the mandibular incisors. I believe that all normal face patterns will fall within a minus to plus 7°, 73° being the norm. In other words, the normal range of the inclinations of the mandibular incisors as related to the Frankfort plane is 66° to 80°.

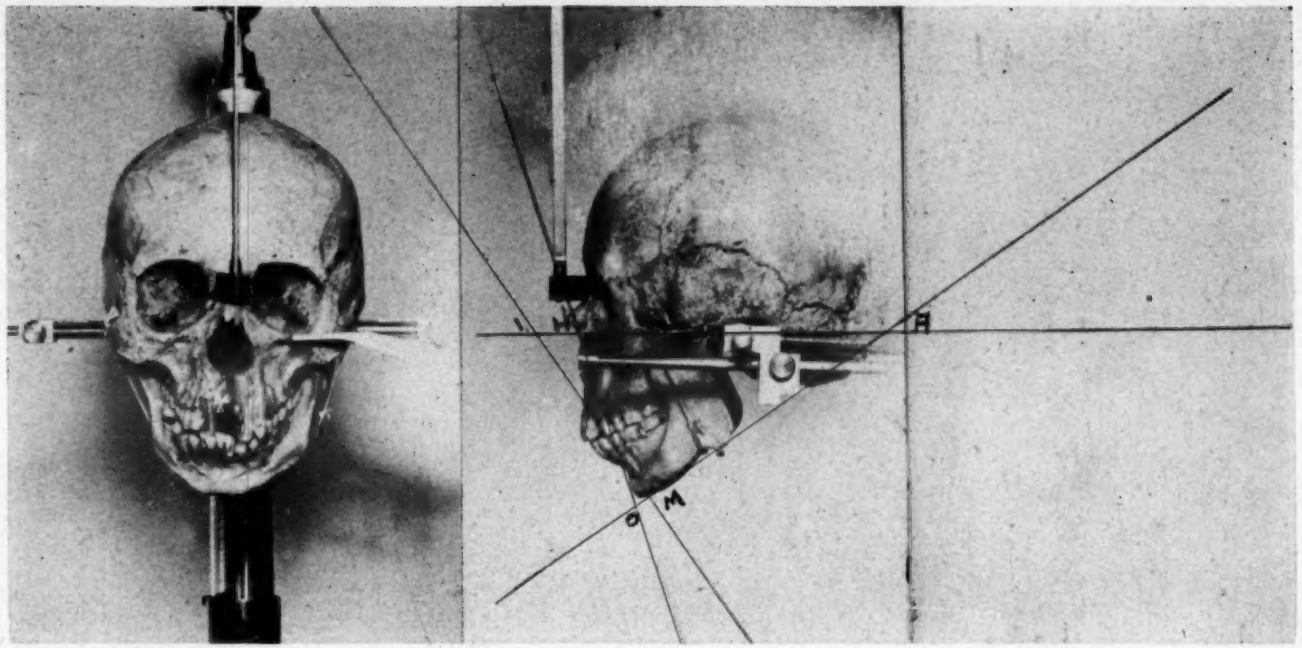


Fig. 25.—This is the skull of an Arizona Indian with a chaotic growth pattern. When a line perpendicular to the lower border of the mandible and passing through the apices of the mandibular incisors is extended upward to intercept the Frankfort plane, the angle *M I A* formed reads 56½°. If the norm is an angle of 73° plus or minus 7°, it becomes obvious that this norm could not be attained for this individual. Construction of an incisor Frankfort angle of 73° is viewed in the angle *O H A*. It becomes clear that it would be a physical impossibility to position the mandibular incisors at *H O* which is the norm. Therefore, the case is one in which all orthodontic objectives cannot be attained.

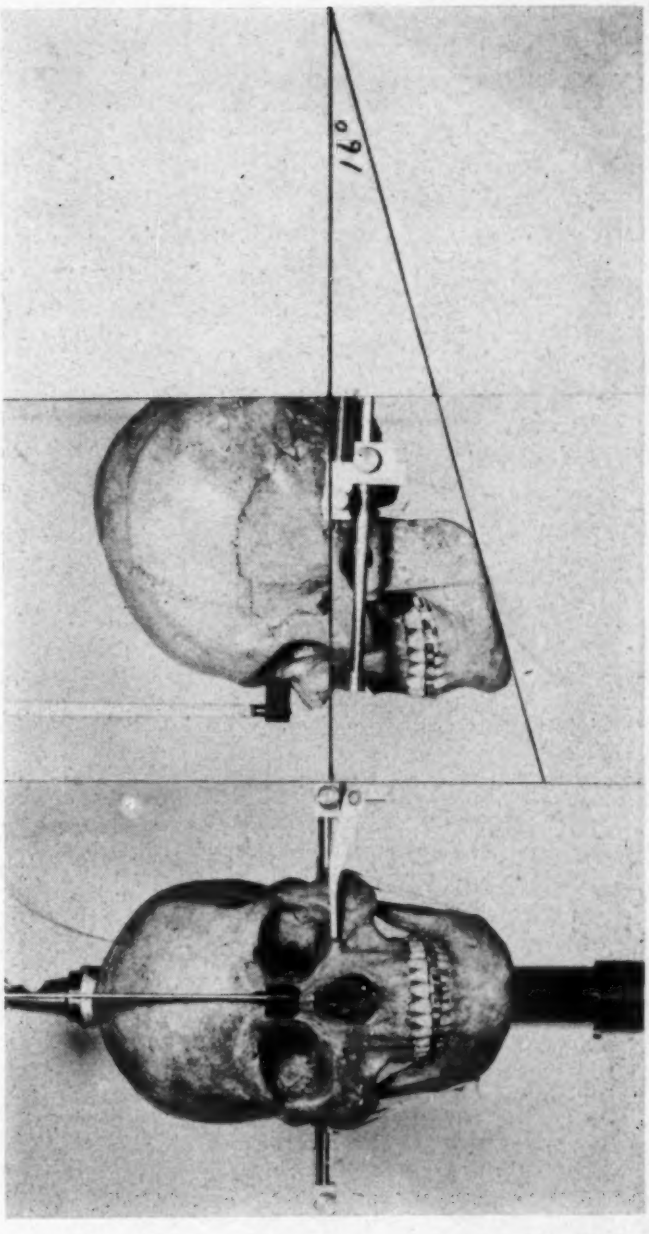


Fig. 26.—An Arizona Indian skull. The denture and growth pattern of the face are both normal. The Frankfort-mandibular plane angle is 16°. Gnathion lies directly below submasion.

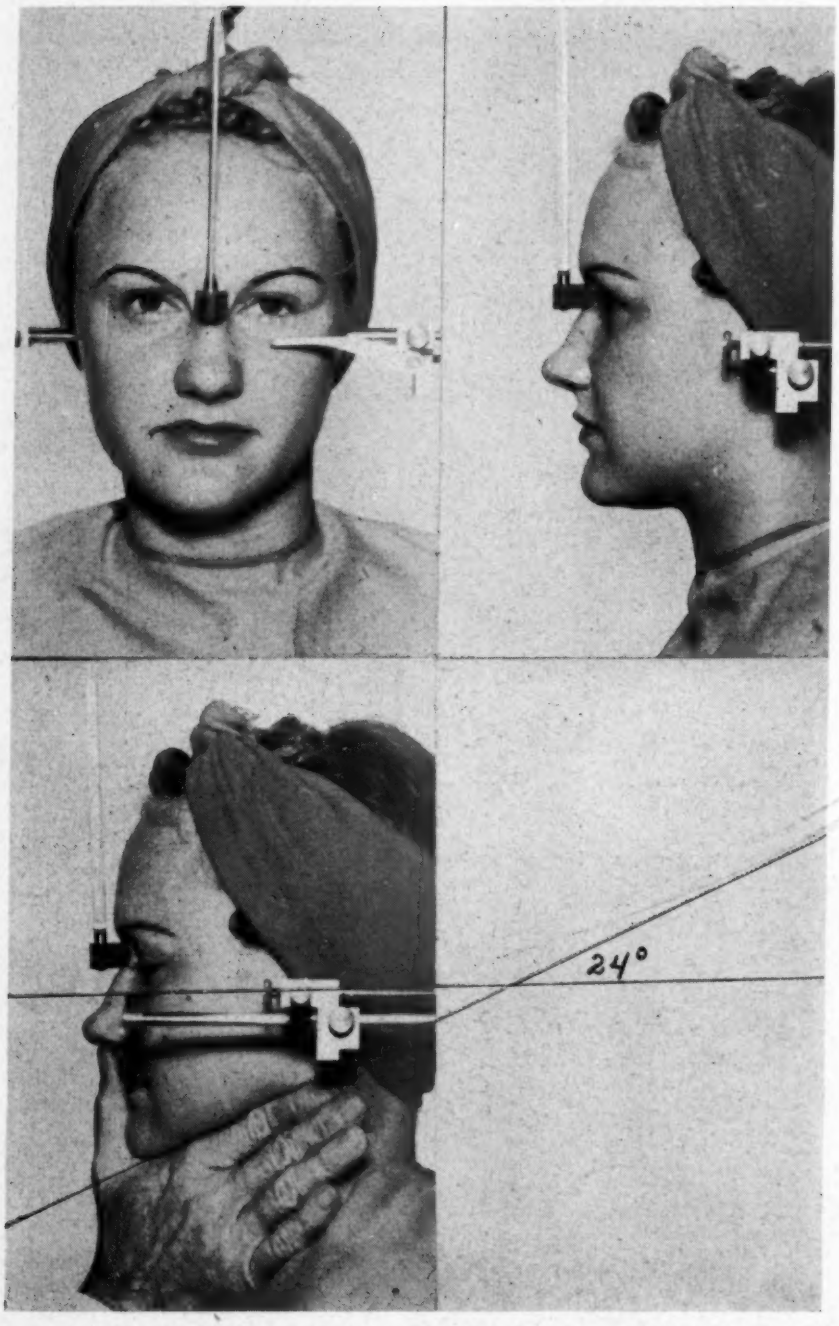


Fig. 27.—A nonorthodontic normal occlusion. The Frankfort-mandibular plane angle is 24°. Note the relationship of gnathion to subnasion.

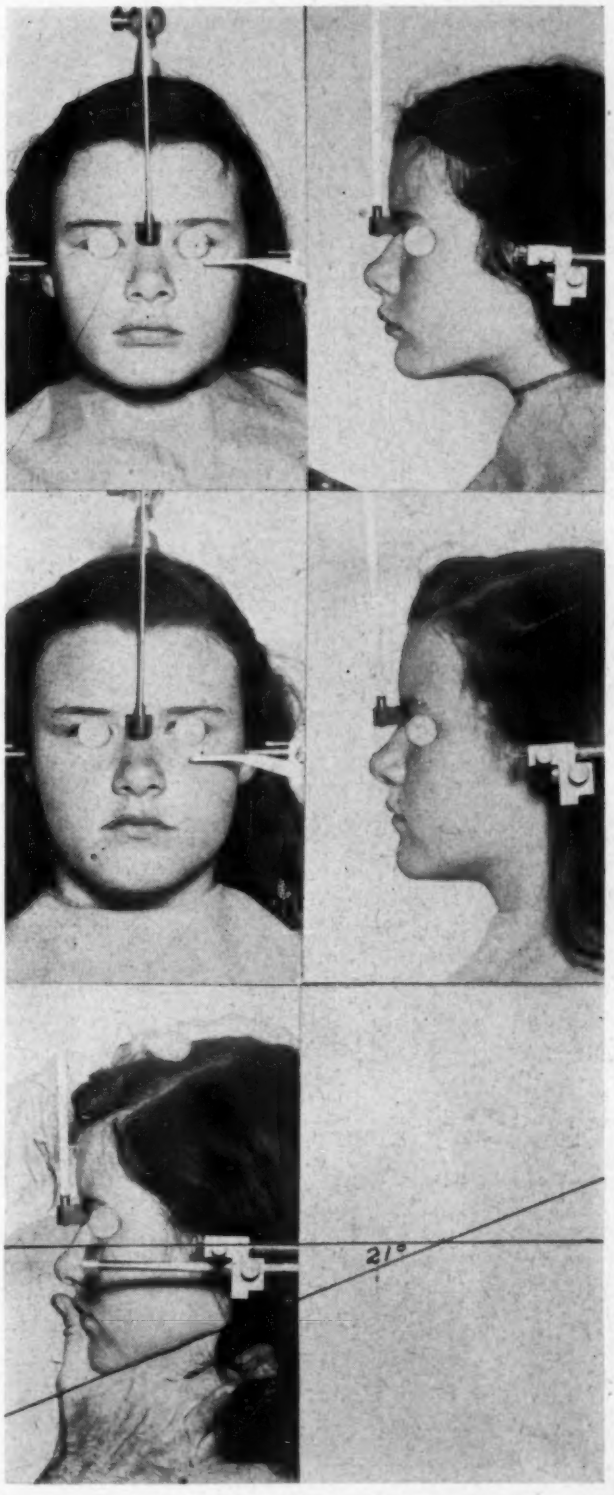


Fig. 28.—A patient presenting a Class II, Division 1 malocclusion in which there is no discrepancy between tooth pattern and basal bone. The Frankfort-mandibular plane angle is 21°. Note the location of gnathion as related to subnasion.

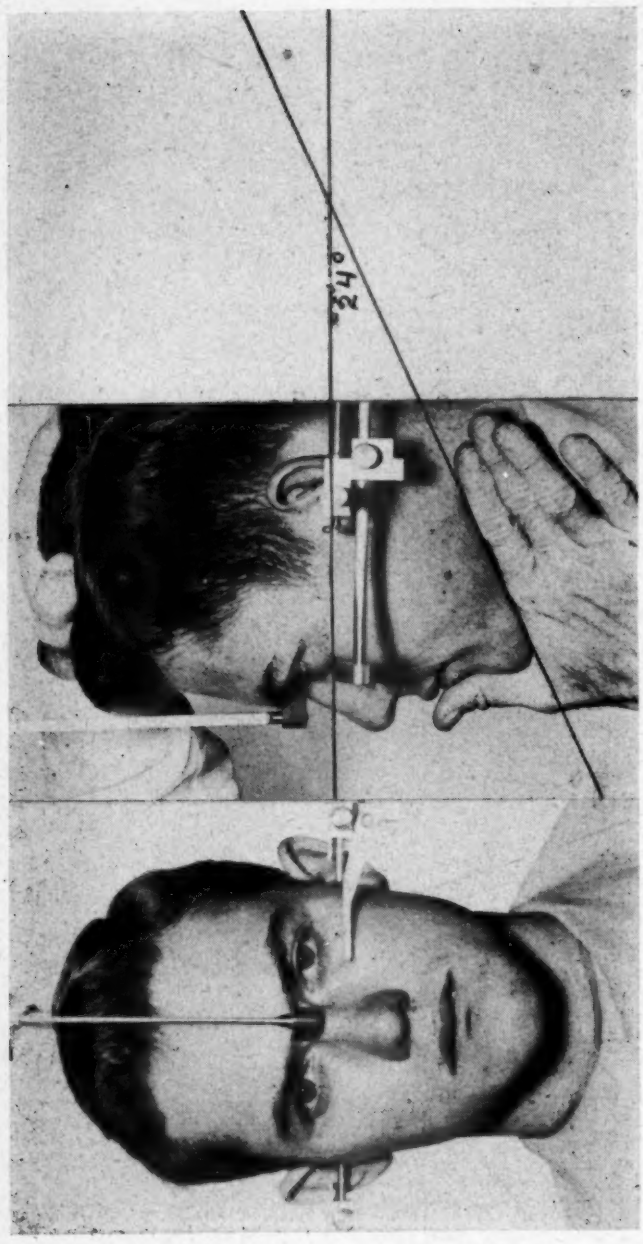


Fig. 29.—Another treated Class I malocclusion in which the Frankfort-mandibular plane angle is within the range of the normal. In this instance it is 24°. Again note the relationship of gnathion to subnasion.

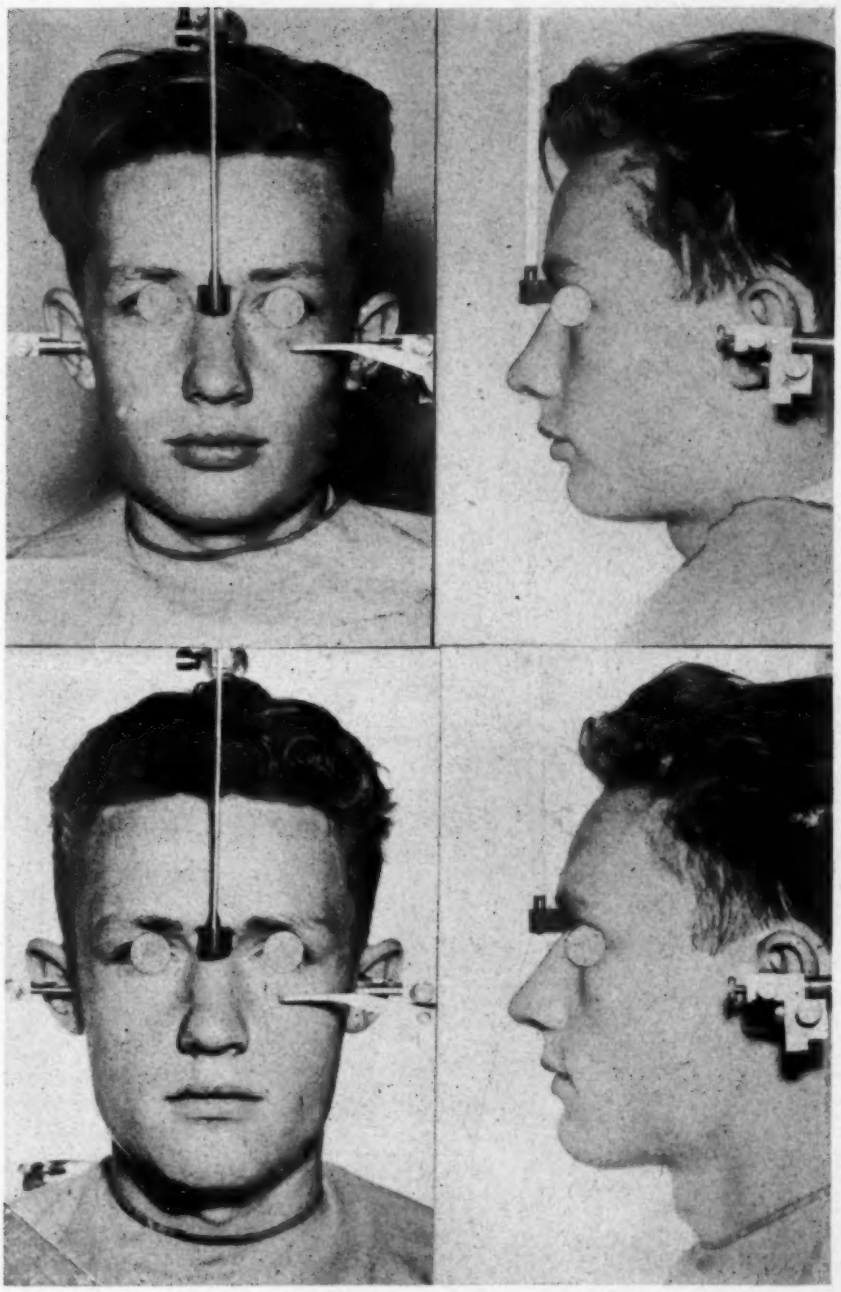


Fig. 30.—Another treated Class II malocclusion with a most favorable Frankfort-mandibular plane angle. A nonextraction case.

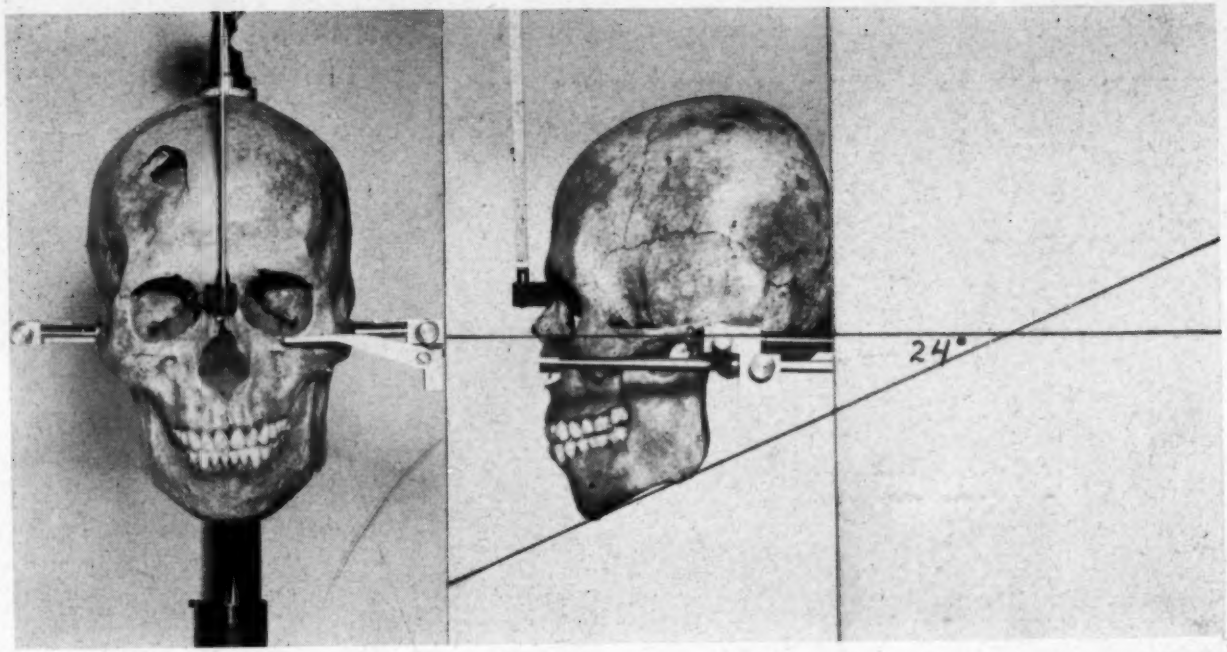


Fig. 31.—The skull of an Arizona Indian. The directional growth of the face is very good. The Frankfort-mandibular plane angle is 24°. There seems to have been lack of growth in the body of the mandible, although the rami are well developed. This is the type of case that orthodontists must learn to recognize and and treat correctly by removing all four first premolars to correct the discrepancy between tooth pattern and medullary bone. This must be done if facial esthetics are ever to be made to simulate the normal.

Fig. 32.—A treated case with an osseous configuration similar to that of the skull in Fig. 31. The Frankfort-mandibular plane angle is 24° and the discrepancy between tooth pattern and medullary bone has been corrected with the results viewed in the illustration. Note that gnathion is not as far forward as related to subnasion as was true in the previous illustration.

Fig. 33.—Another treated malocclusion in which the Frankfort-mandibular plane angle is 26½°. hence prognosis is most favorable. An extraction case.

Fig. 34.—Here the patient presents a face pattern not quite as favorable as the previous patient. The Frankfort-mandibular plane angle is 30°, and while the lower part of the face is a bit diminutive, favorable proportions have been maintained. An extraction case. Note that gnathion lies farther distal in its relation to subnasion.

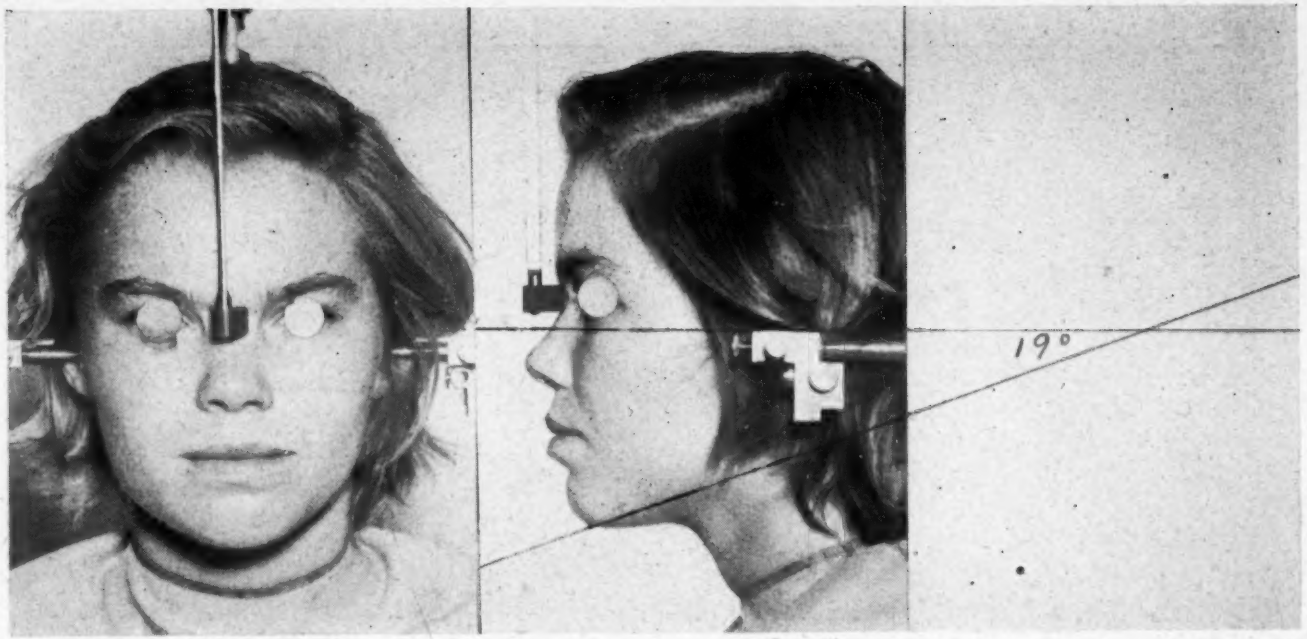


Fig. 35.—An orthodontic tragedy. Here the patient presents a Frankfort-mandibular plane angle of approximately 19°. Gnathion lies directly under subnasion. The directional growth is beautiful and yet because some orthodontist refused to recognize the existing discrepancy between tooth pattern and basal bone, this result was made possible.

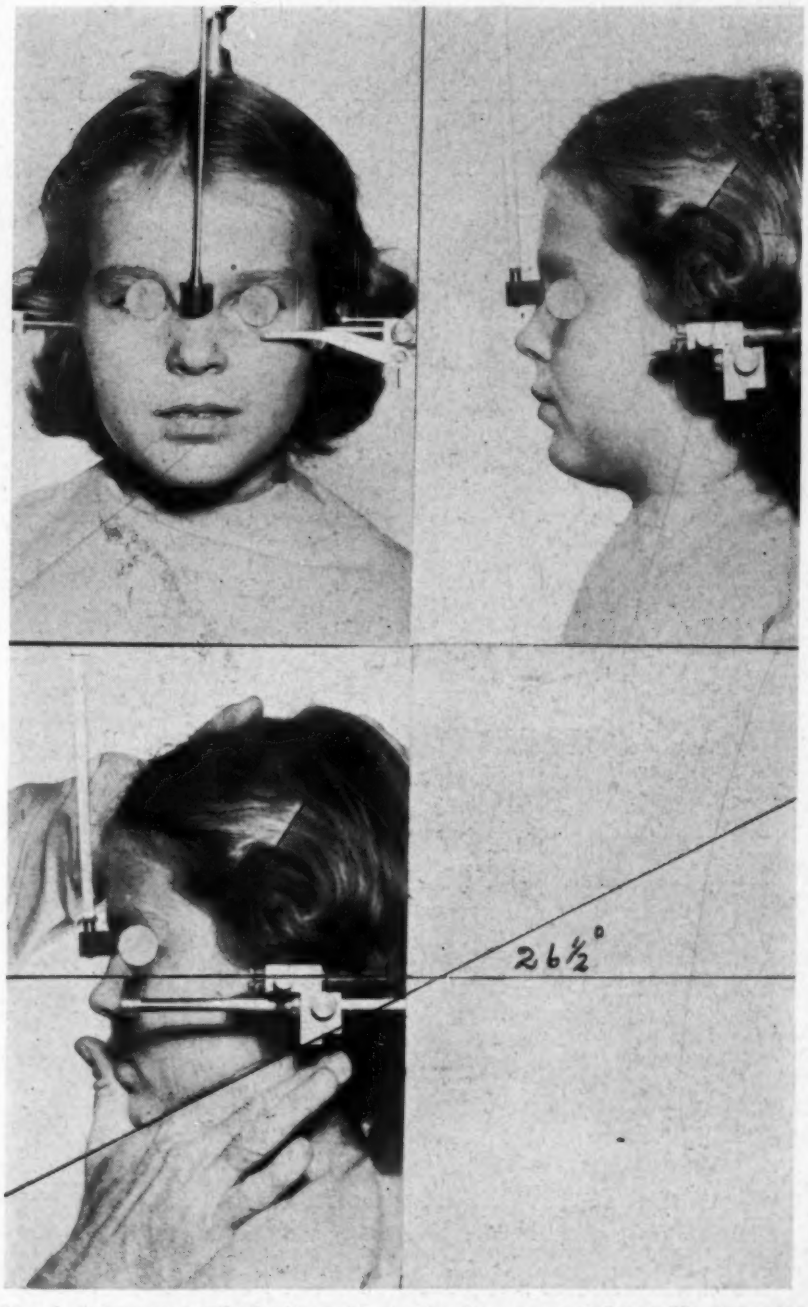


Fig. 36.—A young nonorthodontic patient who has a most favorable directional growth pattern, the Frankfort-mandibular plane angle being 26½°. It is quite obvious to all who have made a study of faces that there is a discrepancy between tooth pattern and basal bone which will require the removal of all four first premolars at a later date if the orthodontic objectives that should be attained are actually attained.

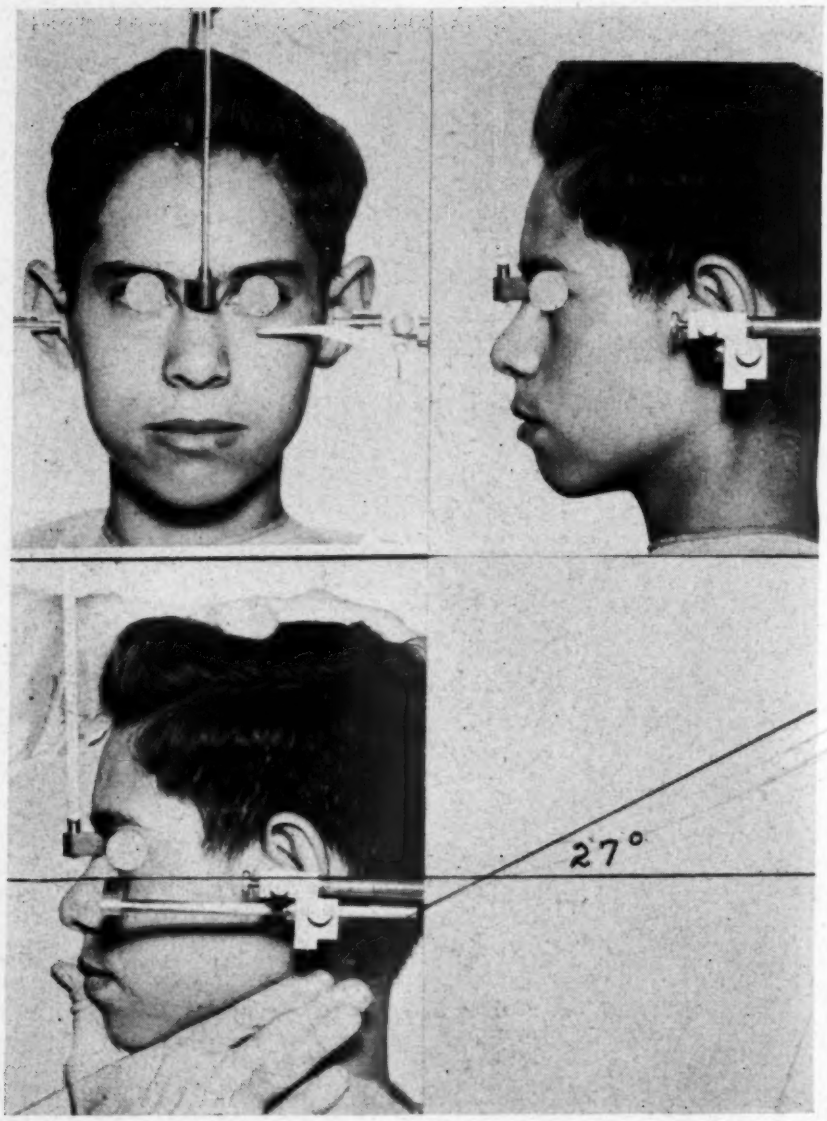


Fig. 37.—A typical nonorthodontic bimaxillary protrusion. The Frankfort-mandibular plane angle is 27°, and the directional growth of the face is fair. Some would call this a normal occlusion, but I cannot agree with them, even though the cuspal relations are normal. An obvious case in which all four first premolars must be removed if all orthodontic objectives are to be attained.

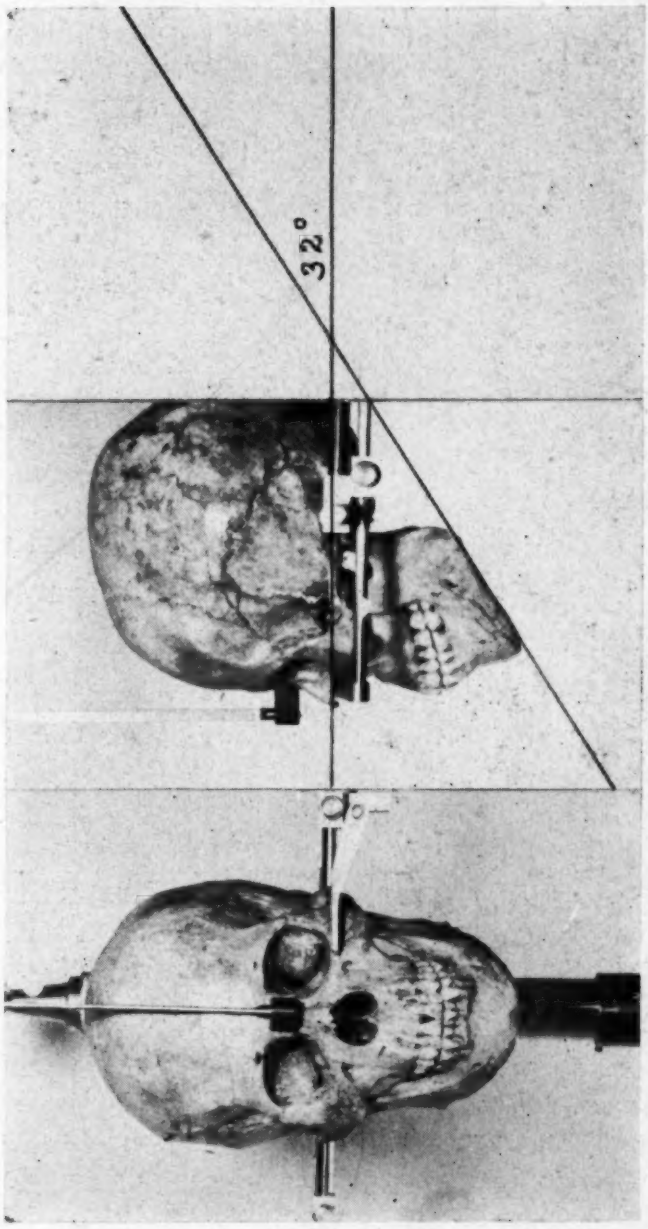


Fig. 38.—A skull of an Arizona Indian. The growth vector is too much downward and not enough forward. The Frankfort-mandibular plane angle is 32°. Note that gnathion lies a bit posterior to subnasion. Virtually all cases presenting the above symptoms will require the removal of all four first premolars. When the Frankfort-mandibular plane angle ranges from 28 to 32°, or to the degree seen in this skull, the ±5° formula will not apply. These cases can be greatly benefited by orthodontic treatment, but they can by no means be considered normal because there has been a fault in growth that has altered the normal growth pattern.

Fig. 39.—A treated case in which the Frankfort-mandibular plane angle is 34°. The face is greatly improved and so is the occlusion. An extraction case.

Fig. 40.—A severe Class II malocclusion complicated by a discrepancy between tooth pattern and basal bone. The case was treated ten years ago. The Frankfort-mandibular plane angle is 35°, and while the face is by no means normal, it is a gratifying improvement.

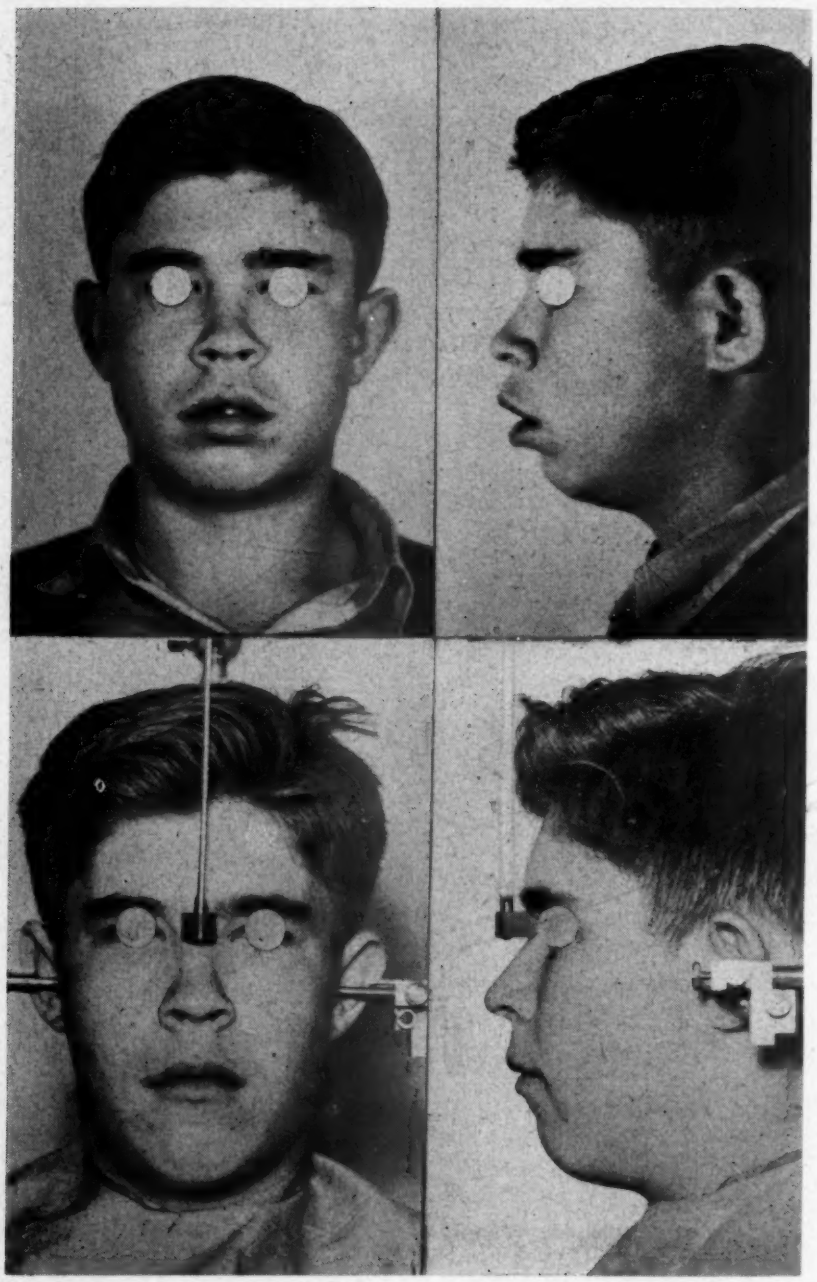


Fig. 41.—Here the Frankfort-mandibular plane angle must be a bit beyond 35°. All four first premolars were extracted and facial esthetics and occlusion have been greatly improved, although facial esthetics are far from normal.

Fig. 42.—This lad presents a Frankfort-mandibular plane angle of 35°. Prognosis is not good so far as facial esthetics are concerned. An extraction case.

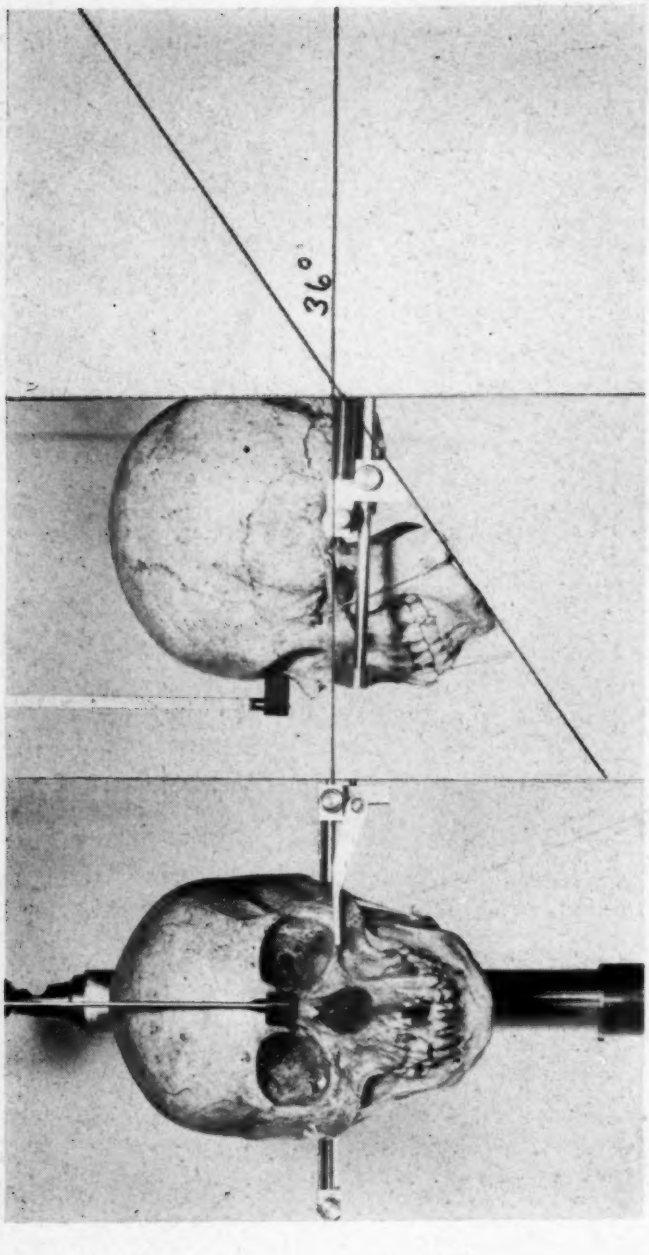


Fig. 43.—The skull of an Arizona Indian. The growth pattern is chaotic. The Frankfort-mandibular plane angle is 36°. The directional growth of the face is bad. Note the position of gnathion as related to subnasion. Extractions in such a case would perhaps be contraindicated in orthodontic treatment.

Fig. 44.—A treated orthodontic case that presents a Frankfort-mandibular plane angle of approximately 39°. A grave error was made in resorting to the extraction of all four first premolars.

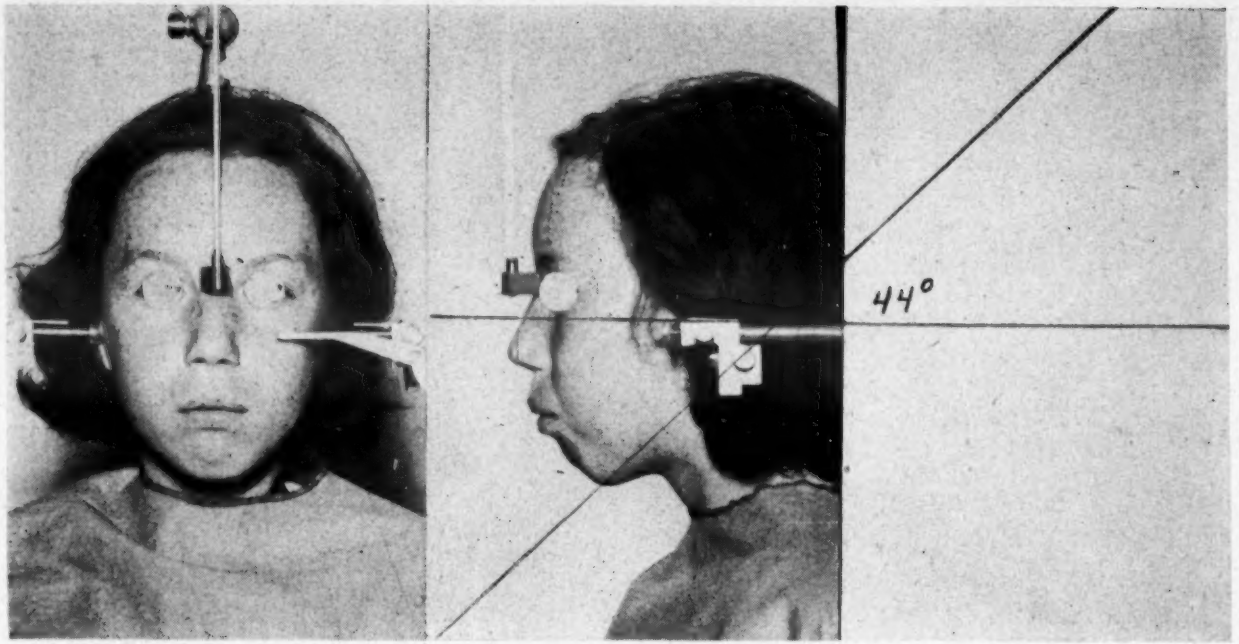


Fig. 45.—A case in which the Frankfort-mandibular plane angle is 44°. The face is chaotic. Extraction would not be indicated. There is little the orthodontist can do for this type of case.

I wish to acknowledge with thanks the assistance of Dr. J. A. Salzmann in the preparation of this paper.

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DISCUSSION

Dr. Herbert Margolis, Boston, Mass.—I consider it a privilege to be asked to discuss Dr. Tweed's latest contribution to orthodontics. However, I am not unmindful of my inability to perform adequately the task assigned.

The paper can be divided into two parts: first, a fuller explanation of the fundamental principles underlying the positioning of the mandibular incisors as related to diagnosis and planning of treatment; second, a projection into the field of prognosis as related to orthodontic treatment.

Dr. Tweed suggests that when research and clinical practice are more closely wedded, then orthodontics will pass out of the realm of necromancy, the horizon will be enlarged, and the service rendered will be not only improved but also greatly increased. This union is of vital concern to the clinician and is steeped in, and correlated with, objective scientific investigation. Although often mentioned, it is unfortunately not common practice in orthodontics.

I should like to discuss first the orientation of the mandibular incisors. It is a matter of record that during a display of a number of case reports by Dr. Tweed some years ago, the editor of the *Angle Orthodontist* called that display the finest clinical demonstration he had ever seen. However, always the objective clinician, Dr. Tweed was dissatisfied with his results; and he changed, rather drastically, his whole method of procedure. It appears that two things influenced this change: first, the facial contours of some patients were not improved as a result of treatment, but rather were more prognathous; and, second, in some other cases the teeth again became irregular after retention. In the first case, teeth were aligned but the face distorted; in the other, the teeth were crowded but the face remained normal.

Dr. Tweed made the discovery for which all orthodontists and patients should be everlastingly grateful: that, in the course of so-called orthodox treatment, very often the mandibular incisors were tipped forward. The result was either a prognathous face or crowded teeth. There remained the convenient excuse of pressure from the third molars; and then there was the more remote refuge of heredity or the endocrines. If the third molars were congenitally absent or were removed surgically, and if the internist gave a negative report, then we blamed the resultant failure on type.

The fact remained, however, that these incisors had been tipped forward during treatment. They were more procumbent after treatment than before treatment. Dr. Tweed was, indeed, not alone in accomplishing this; every orthodontist in the country was blissfully pushing these teeth forward. Published case reports indicate that. Scientific records, only a few years ago, of treated cases also indicated just that. Many of these cases were then considered successful by authorities in this specialty. When Dr. Tweed began teaching the uprighting of the mandibular incisors, from a clinical standpoint, he was censured by some rather severely; chiefly, because he did not express the uprighting in an accepted scientific term; and, also, because in the opinion of some critics, he had considered facial contour from a single preconceived ideal. From my investigations, I found that what Dr. Tweed was doing in uprighting the incisors was in direct harmony with evolutionary trends in the development of man and that tipping these teeth forward by the orthodontist is, in my opinion, "evolution in reverse."

The resultant failure had nothing to do with remote causes in many cases. We orthodontists were responsible and it will not serve the profession to deny the responsibility. Many orthodontists have since accepted that principle of "uprighting" the mandibular incisors, or at least of not increasing their procumbency.

In the evolution of man there is an increase in the size of the brain, associated with a reduction of the snout. All available material indicates that during the process of the reduction of the lower third of the face, the incisors have been rotated lingually, on a horizontal axis, with the apex of the incisor at or near to the fulcrum. The clinical results demonstrated by Dr. Tweed are in direct harmony with that scientific fact.

There is another anatomic correlation with the uprighting of the mandibular incisors not previously mentioned that I should like to suggest at this time: starting with the anthropoid, we find prominent supraorbital ridges with a receding frontal bone associated with procumbent mandibular incisors. From the standpoint of mechanical advantage, that is admirably efficient. Because of the lack of vertical forehead in the ape, these heavy supraorbital ridges serve as buttresses to withstand the impact of occlusion (Fig. 1). In modern man there is an increase in the parietal areas of the brain. Also the frontal bones become more upright and a forehead is developed. The supraorbital ridges of the ape have disappeared in man. Likewise, the mandibular incisors have become more upright.

Fig. 1.

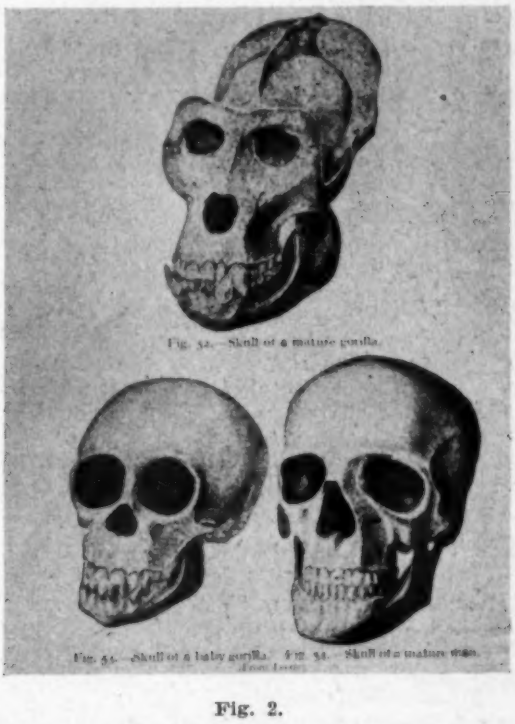

Fig. 2.

Fig. 1.—"One of our nearest living relatives. Female Chimpanzee and Young." (From *Almost Human* by R. M. Yerkes; The Century Co.)

Note prognathous mouth, large supraorbital ridges, receding frontal bone.

Fig. 2.—(*Man and His Forerunners* by Buttel-Reepier.)

Note the correlation of procumbent incisors with the supraorbital ridges in the mature gorilla.

These ridges serve as buttresses for the massive jaws and procumbent teeth. With the uprighting of the incisors in modern man, there is an uprighting of the frontal bone.

The baby gorilla (left) is more nearly like modern man.

With the recession of the snout and the uprighting of the incisors, what is there then in the cranium to withstand impact of occlusion in the anterior segment in man? Examination of the mechanics involved would indicate that the ridges are no longer necessary. The vertically elongated forehead, due to the uprighting of the frontal bone, serves beautifully as a mechanical buttress for the stress of occlusion for the lower third of the face reduced by the uprighting of the mandibular incisors. (Fig. 2.)

I should like to make this point clearer in the following manner:

If a vertical blow were directed at the lower edge of a board, inclined at an angle of 45 degrees or more, a horizontal beam or some reinforcement would be necessary to resist the stress. However, if the impact were in direct line with the board, so that edge strength were utilized, no reinforcement would be necessary. Likewise, we all know how

much more resistant to bending a rectangular piece of wire is on its larger dimension than on its lesser dimension. Therefore, in the evolution of man, concomitant with an increase in the size of the brain, there is an uprighting of the frontal bones, creating the forehead or the lofty brow and the consequent disappearance of the supraorbital ridges. Together with the uprighting of the frontal bone there is decrease in the tooth bearing structure, an uprighting of the mandibular incisors, and the development of a chin following the loss of the simian shelf. All this is an impressive demonstration of functional adaptation.

In orthodontic therapy, with the advent of intermaxillary elastics, the orthodontist has often thrown out of harmony one of those forces when he increased the angle of inclination of the mandibular incisors, increasing the facial prognathism. It is one thing for a child to have a prognathous face normally; it is quite another matter for the orthodontist to create one. (Fig. 3.)

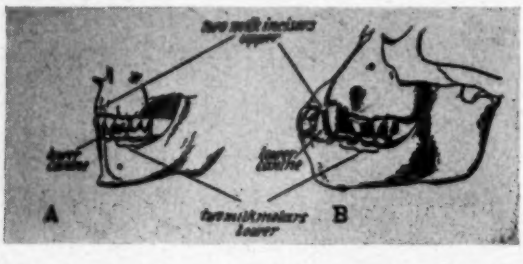

Fig. 3.—(*Our Face from Fish to Man* by William K. Gregory.)
Further evidence of the reduction of the tooth-bearing bones of the maxilla in man (*A*). Orthodontic therapy certainly should not convert *A* to *B*. (*B*, Anthropoid.)

Now, the question of the relation of the mandibular incisors to the mandibular plane is an interesting one. In the majority of nonprognathous faces that I have examined, I found, as stated in an earlier paper, that they are perpendicular to the mandibular plane. However, the greatest value of that information is in knowing the original inclination of these incisors prior to treatment and in not increasing that inclination when the angulation is approximately 90 degrees or more. There has as yet been presented no clinical or scientific evidence to deny this observation in treatment. There appears to be no room for any further doubt of that procedure in clinical orthodontics.

Dr. Angle urged orthodontists to study carefully the contours of the face of children under treatment. He emphasized in the seventh and last edition of his book, the fact that it was possible to make a child quite beautiful, or the reverse, as a result of orthodontic treatment. He developed a science from chaotic procedures, a base upon which to build. While much has been written of face form in orthodontics, nothing really has been done about it in practice. Remember Mark Twain's famous comment about everybody talking about the weather without anybody doing anything about it. That condition prevailed until Tweed made his great contribution in clinical orthodontics, linking tooth alignments with facial harmony. His case reports and many from others who studied with him bear eloquent testimony to the truth of his teaching.

With regard to the second part of the paper, namely, the relation of the Frankfort-mandibular plane angle to the contours of the lower third of the face and to prognosis in treatment, Dr. Tweed brings forth a fundamental observation which warrants serious consideration. He appreciates fully the fact that there is no rule of biometrics applicable to therapy that is inflexible and without exceptions. Intelligence must be the constant companion in case analysis in orthodontics. Additional basic principles are necessary for orthodontics to assume its rightful sphere and less of the "by guess and by God" formulas.

I consider the most significant phase of Tweed's correlation of the inclination of the mandibular plane with success in treatment, the restatement of the fact that while he admires a nonprognathous face, he realizes that it cannot be obtained in every case. Now, he has offered a practical guide in prognosis based upon his experience. This Frankfort-

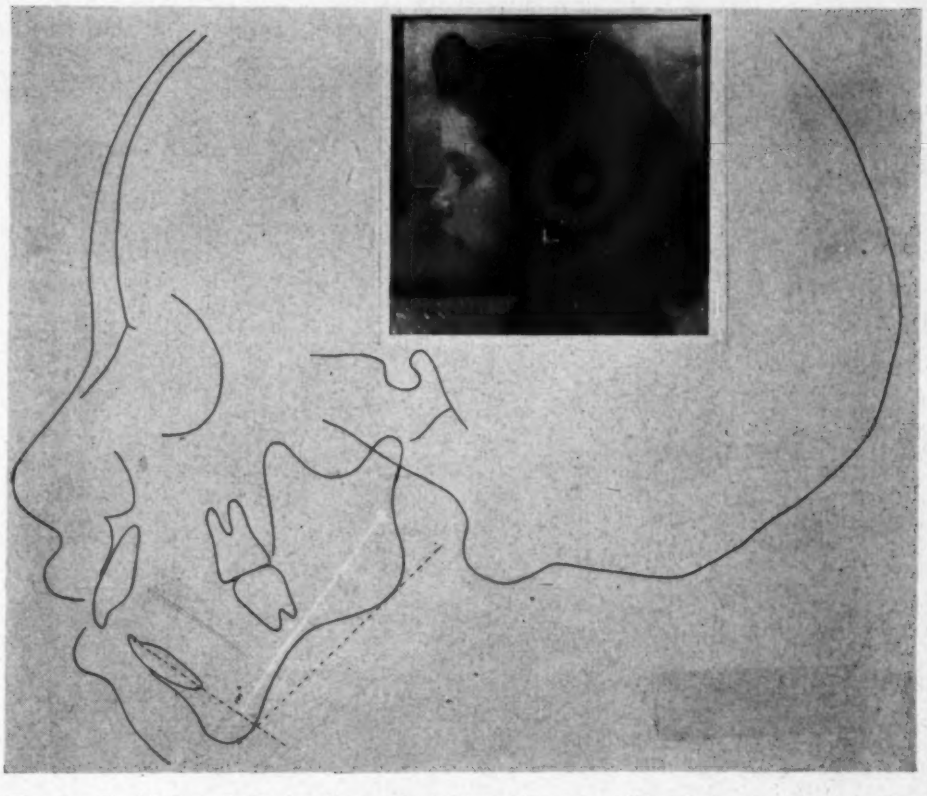

Fig. 4.—Sagittal cephalic tracing and photograph of a child. Extreme arrest in developmental growth centers of the mandible associated with infection in infancy. Large Frankfort-mandibular plane angle. According to Tweed prognosis would be hopeless by orthodontic therapy alone.

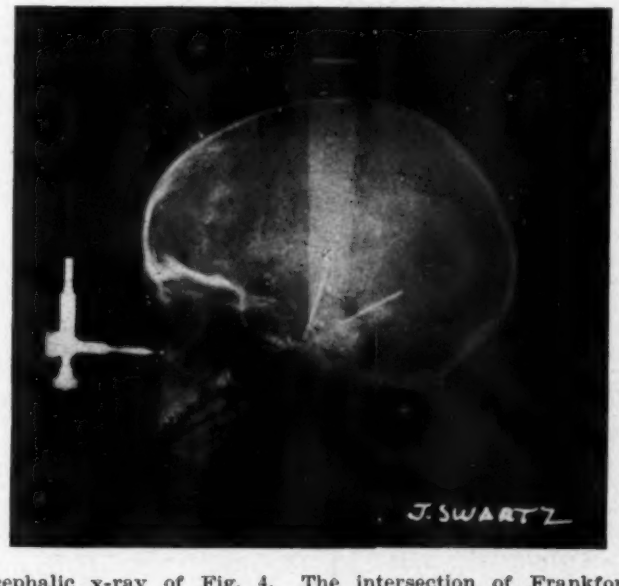

Fig. 5.—Sagittal cephalic x-ray of Fig. 4. The intersection of Frankfort and mandibular planes would be very close to tragion.

mandibular plane angle will serve as a guide and a red light when discussing prognosis, prior to starting treatment. Obviously, it is much healthier for all concerned to have that knowledge available before undertaking a case than to apologize after treatment.

That further elaboration of this correlative factor is necessary is quite apparent to Tweed, who suggests in this paper that he hopes others will investigate his study based upon their own clinical experience. He has provided another important germinal seed for use in practice.

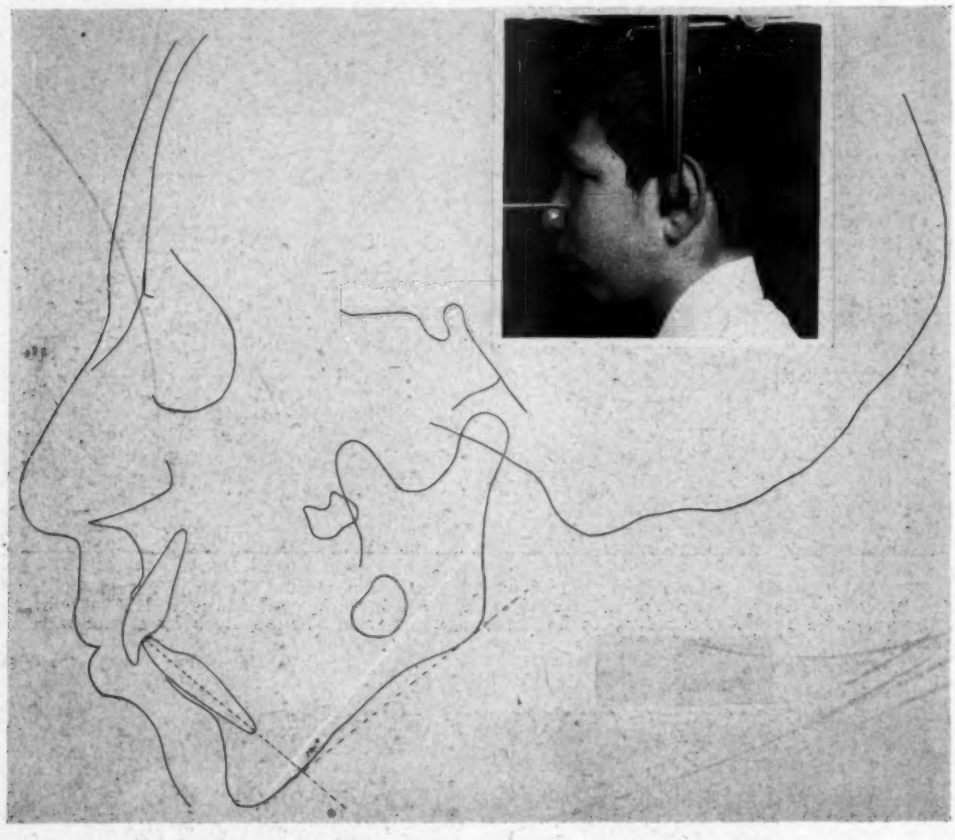

Fig. 6.—A tracing of a sagittal cephalic x-ray of a boy aged 11 years. Arrest in growth of rami and inferior border of mandible. Not a true bimaxillary protrusion. Prognosis not good for obtaining nonprognathous profile.

There are some features regarding this angle that I should like to discuss briefly. When Tweed describes the mandible with arrested development at the growth centers, he emphasizes the limitations of the possibilities of orthodontic treatment. That type of case in its extreme is illustrated in Figs. 4 and 5. Therein you see an arrest in the rami and body of the mandible, the lower border being quite convex in an upward direction. Though the mandibular incisors are nearly parallel to the Frankfort horizontal plane, the incisor mandibular plane angle is not at all as great as one would expect. The Frankfort mandibular plane angle is hopelessly large according to Tweed's classification. This type of case is always associated with some trauma or infection in the neck in the region of the condyle.

Fig. 6 shows a case of arrested development of the type mentioned by Dr. Tweed but not nearly as severe as the case preceding. Many other cases can be shown which would illustrate similar conditions in varying degrees. The mandibular incisors in this type of case are sometimes nearly perpendicular to the mandibular plane, yet in relation to the Frankfort plane they appear to be procumbent, and the face certainly is not non-

prognathous. I believe this type of case has been wrongly classified as bimaxillary protrusion. It would appear, in this paradoxical situation, that here indeed is a condition where the correlation of incisor mandibular plane angle is entirely wrong, for the mandibular incisors are sometimes like those of a sheep, and the face is certainly not nonprognathous.

Wherein lies the error of interpretation?

The inclination of the incisors in those cases may very well be correct as related to the mandible; the deformity, however, lies within the mandible itself. Tipping back the incisors, in that type of case, is not the solution, for they may be correct or nearly so in inclination. If that patient is to obtain a normal face, it would be necessary to lengthen the body of the mandible, mostly at the border, and to lengthen the ascending rami. An orthodontic appliance can never do that. This condition, though extreme, demonstrates the necessity for consideration of the entire anatomic field with which the orthodontist is concerned, not simply the teeth and alveoli.

A. *B.*

Fig. 7.—Profile of boy before (*A*) and after (*B*) orthodontic treatment. Large Frankfort-mandibular plane angle indicates that nonprognathous face as a result of orthodontic treatment is not possible. However, if incisor mandibular plane angle is not increased during treatment, an improvement in facial contours may be obtained.

Arrested development then is the basis, I believe, for Tweed's contribution regarding prognosis. Many children come to our office who, because of trauma or disease, have severe downward inclination of the mandibular plane in varying degrees. In a brief manner I mentioned that in my paper on "The Axial Inclination of the Mandibular Incisors."* Successful prognosis, Tweed says, is inversely proportional to the degree of that inclination, The greater the inclination, the poorer the prognosis.

In order to interpret properly the inclination of the mandibular plane, I should like to suggest, then, that the following anatomic structures also be studied and correlated:

*Am. J. Orthodontics and Oral Surg. 29: 571, 1943.

1. Height of rami (Figs. 6 and 7).
2. Gonial angle.
3. Length of inferior border of the mandible (Figs. 8 and 9).
4. The height of the mandible from molar to inferior border as compared to the height of the mandible from incisal edge to inferior border.

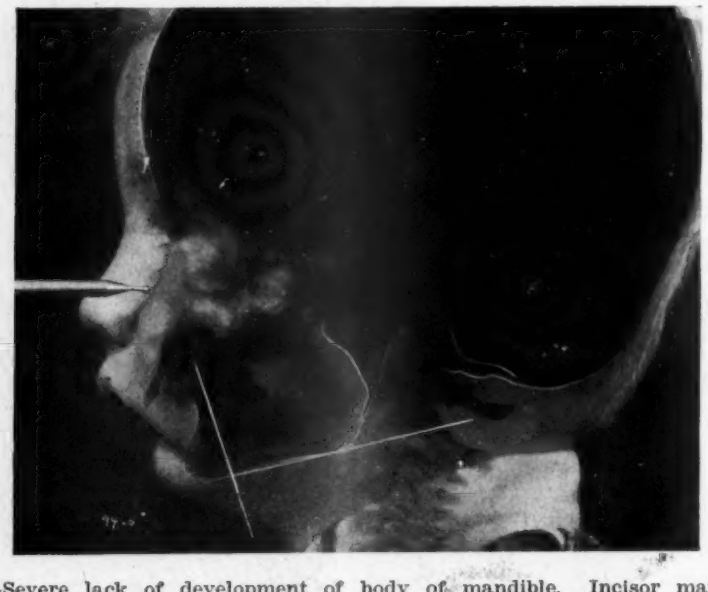

Fig. 8.—Severe lack of development of body of mandible. Incisor mandibular plane angle practically normal. Increasing that angle would ruin any possibility of correction. Short inferior border of the mandible. Severe Class II, Division 1. Compare with Fig. 9.

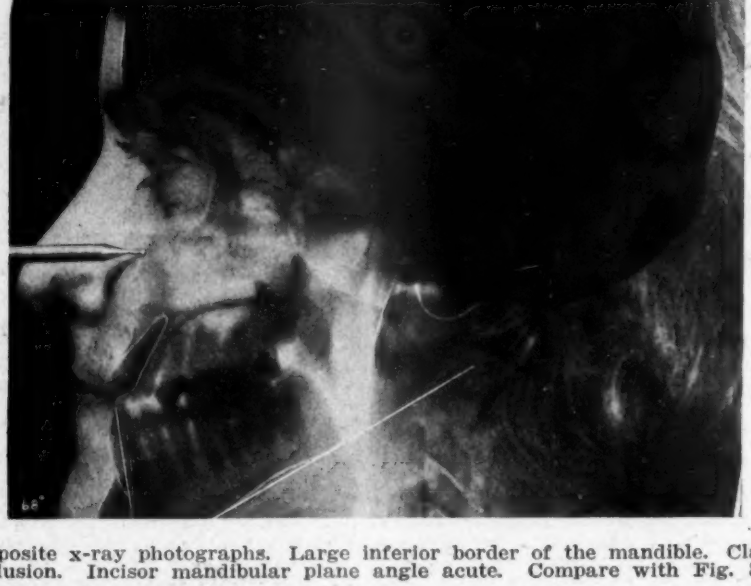

Fig. 9.—Composite x-ray photographs. Large inferior border of the mandible. Class III malocclusion. Incisor mandibular plane angle acute. Compare with Fig. 8.

An increased Frankfort-mandibular plane angle, due to trauma or disease and manifested as arrested development in varying degrees, is, in my opinion, different from a true bimaxillary protrusion. I refer to the prognathous white, where the rule generally is for a nonprognathous face. The mandible and maxilla in the true bimaxillary protrusion are

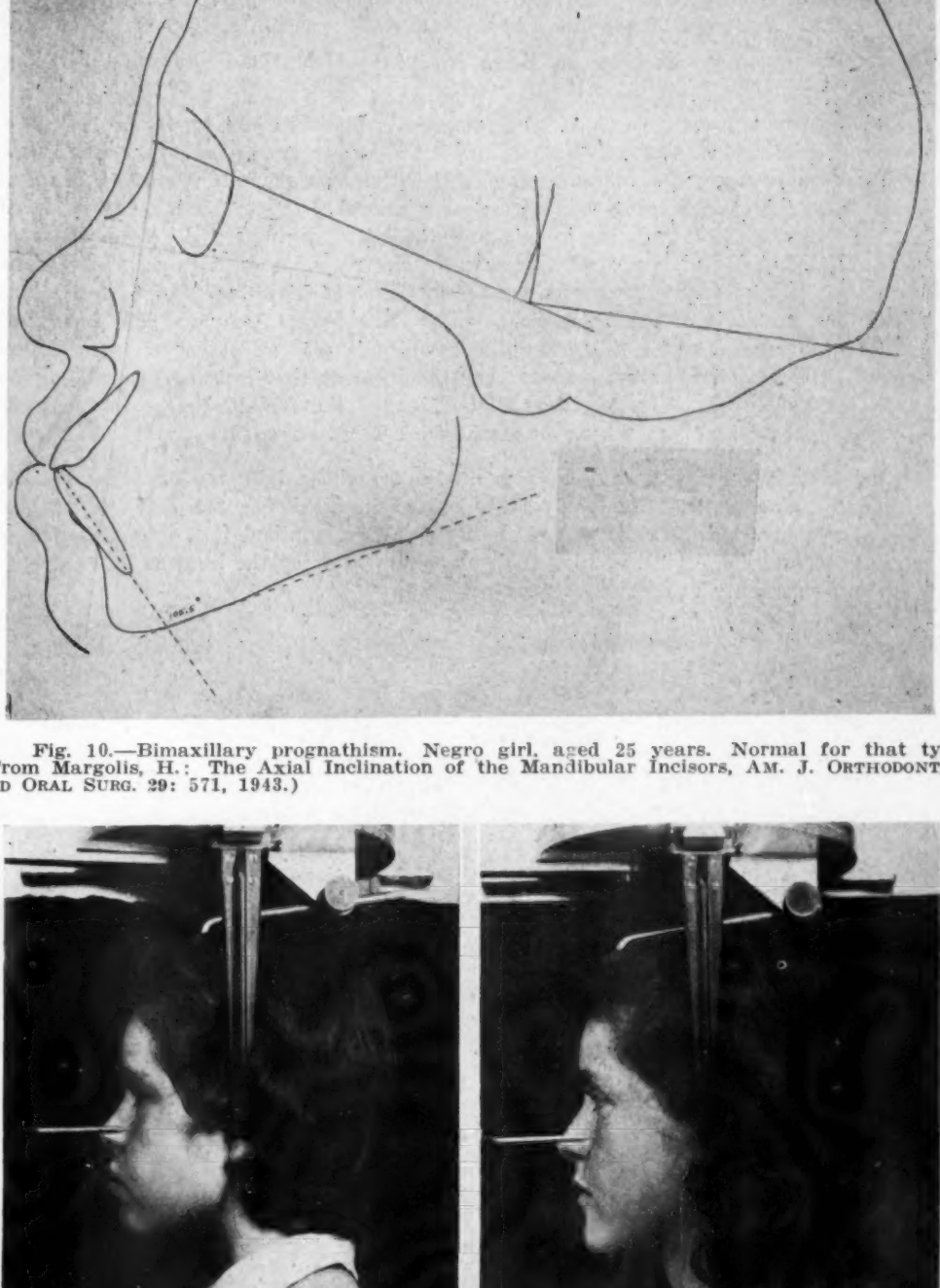

Fig. 10.—Bimaxillary prognathism. Negro girl, aged 25 years. Normal for that type. (From Margolis, H.: The Axial Inclination of the Mandibular Incisors, AM. J. ORTHODONTICS AND ORAL SURG. 29: 571, 1943.)

A. *B.*

Fig. 11.—I believe that *A* illustrates a true bimaxillary prognathism in a white child similar to Fig. 10. *A*, before, and *B*, after, orthodontic treatment.

well developed and proportional. The teeth related to the mandibular plane are procumbent as compared to the nonprognathous white, and they are stable. (Fig. 10.)

A true bimaxillary prognathous condition in a white, I think, may be termed "delayed evolution" or "incomplete evolution."

Double protrusion, when the result of tipping the mandibular incisors forward, is different from a true bimaxillary prognathism in that the former is one created by the orthodontist—the face of the child before treatment being nonprognathous; in the latter, the true bimaxillary, the child presents normal cuspal relationship of the teeth but a prognathous face. The former is "evolution in reverse" the latter, perhaps, "delayed evolution." Examples of "delayed evolution" may be seen in the retention in man of the platysma myoides muscle so vital to the horse to chase off flies, but of little importance to man. The appendix in the rabbit is of great functional value but as yet little proof has been shown of its value to man. And so the prognathous white is also an evidence of incomplete or "delayed evolution." Whether orthodontists should treat that type of case has already been answered by Tweed. Fig. 11 is an illustration of the facial changes in the profile of my concept of a true bimaxillary protrusion which I have treated.

May I close with my expression of gratitude for the privilege of reading and discussing Dr. Tweed's paper. The study clubs named in his honor are thankful that the Lord has spared him from his recent severe illness. We are proud that even then he carried on, and we pray he may be with us for many years to enjoy the rewards he so strongly merits and so constantly avoids.

Editorial

THE FRANKFORT-MANDIBULAR BASE ANGLE IN DENTOFACIAL ESTHETICS AND ORTHODONTIC PROGNOSIS

TO UNDERSTAND fully the Tweed concept and procedure of orthodontic mechanotherapy—frequently referred to as the "Tweed Philosophy"—we should keep in mind the fact that Tweed is primarily a clinical orthodontist and as such he belongs to the category of "practical" men. Orthodontics has had in the past and has today its due share of "practical" observers. These are constantly being "discovered" by the researchers whose numbers are slowly but steadily increasing in the field of orthodontics. It is nothing new for a man engaged in laboratory or correlative statistical and anthropometric research in orthodontics to find that his data tend to substantiate the beliefs and pronouncements of "practical" orthodontists who arrived at their conclusions by following clinical observation over many years of practice.

A classic example of the foregoing is to be found in the, at present, widely accepted philosophy propounded over a quarter of a century ago by Mershon. It was Mershon, a "practical" orthodontist, who brought to the fore the conclusion, based entirely on clinical observation, that growth and development which continue to take place in the child regardless of whether or not he is receiving orthodontic treatment can be integrated with the treatment itself in obtaining favorable results, and that, if the normal expression of growth is interfered with, orthodontic therapy will be found of little or no avail. The subsequent findings of Hellman, Broadbent, Brodie, Margolis, and numerous others have since proved the validity of Mershon's observations. Added examples are Angle's observations on the permanent first molar and Atkinson's work on the "Key Ridge."

Tweed was not content to wait for laboratory and correlative workers to "discover" a scientific basis for his clinical conclusions. He took occasion to delve into the work of orthodontic research men who have made major contributions on growth and development of the face. Much to his gratification, Tweed found proof to substantiate his conclusions on the relationship of the mandibular incisors with a plane tangent to the most dependent portions of the body of the mandible, in the accumulated data of such men as Broadbent, Brodie, and Margolis.

Tweed found further that orthodontic tooth movement was followed by "collapse," when the incisor teeth were forced off the medullary bone of the body of the mandible, especially where the incisor mandibular plane angle was increased in degree, or where development of the jaw itself was primarily insufficient to accommodate the teeth over medullary bone. Tweed then advo-

cated the reduction of the mesiodistal configuration of the teeth as a solution to the impasse created by the disproportion in tooth-bony base relationship. This reduction or extraction of teeth was intended to produce better esthetics and more permanent results. However, the criteria for extraction were more or less vague, and depended to a high degree on the subjective esthetic sense of the orthodontist, the patient, or his family.

By establishing a relationship between the degree of angularity of the Frankfort mandibular base angle and the height of the ramus of the mandible, Tweed has taken a more positive step, which not only gives a scientific basis to his original conclusions but also provides definite criteria for extraction as a means of improving esthetics and insuring lasting results.

In his article, "The Frankfort-Mandibular Plane Angle in Orthodontic Diagnosis, Classification, Treatment Planning, and Prognosis," published on page 175 of this issue of the JOURNAL, Tweed presents evidence on the intimate relationship of facial growth, facial esthetics, and the normal occlusion of the teeth. Moreover, by integrating the size of Frankfort-mandibular base angle and the incisor mandibular plane angle to orthodontic procedure, Tweed has successfully demonstrated the practical application of anthropometric measurement of the dentofacial area to the everyday practice of orthodontics.

J. A. Salzmann.

Resolution Pertaining to the American Journal of Orthodontics and Oral Surgery

THE following excerpts are taken from the minutes of the meeting of the Southwestern Society of Orthodontists, held in Oklahoma City on Jan. 21, 22, 23, 1946.

Dr. Spencer presented a resolution as follows:

The Southwestern Society of Orthodontists, being a component part of The American Association of Orthodontists, has for many years enjoyed a satisfactory publication relationship with the AMERICAN JOURNAL OF ORTHODONTICS AND ORAL SURGERY. This JOURNAL acts as the official publication for this society. The society is represented on the editorial board of the JOURNAL by a regularly elected representative who has equal rights and voice, along with the representatives of other component societies, in creating the policy of the JOURNAL.

WHEREAS, the so-called privately created Committee on Journalism of the American College of Dentists did actually and deliberately create and execute a plan for propaganda purposes during the summer of 1945 and did send reprints through the United States mails to the entire membership of the American Dental Association, and such reprints did contain false and misleading statements in regard to the publication relations of THE AMERICAN JOURNAL OF ORTHODONTICS AND ORAL SURGERY and the American Association of Orthodontists and its component societies;

WHEREAS, for the past fifteen years the said commission has periodically sent out propaganda material of its own creation with the plain purpose of trying to create dissension between the JOURNAL and the organizations that it serves;

WHEREAS, request has been formally made to the said committee for retraction of such statements, and no retraction has been made, and the acts of this committee in the above incidents are regarded by this society as presumptuous, in poor taste, and in violation of professional ethics;

THEREFORE, BE IT RESOLVED, that it is the sense of the Southwestern Society of Orthodontists here assembled in its annual meeting that the said Committe on Journalism by its attitude, acts, and methods is fulfilling no constructive purpose but is creating friction and animosity between dental groups, and that this society regard the above acts and methods as un-American and undemocratic.

BE IT FURTHER RESOLVED, that it is the sense of this society that any matters pertaining to the publication of its proceedings which may be of concern to minority groups or other dental groups be taken up regularly and directly with the properly elected officers and committees of this organization, and that this society regard any other approach as destructive to the harmony of various groups.

BE IT FURTHER RESOLVED, that the Southwestern Society of Orthodontists, being a component part of the American Association of Orthodontists, here and now requests of the Committee on Journalism of the American College of Dentists to cease and desist its unsolicited activities in connection with the publication of affairs of this society and its official publication.

BE IT FURTHER RESOLVED, that the secretary of the Southwestern Society of Orthodontists spread a copy of these resolutions on the minutes of this society and that copy of same be mailed by him to members of the Committee on Journalism of the American College of Dentists and to the officers of the American College of Dentists.

Motion was made by Dr. Turner that these resolutions be adopted and incorporated in the minutes of the Southwestern Society of Orthodontists; seconded by Dr. Flesher; motion carried unanimously.

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American Association of Orthodontists
Serving in the Armed Forces

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Cleveland, Ohio
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Dr. W. R. Alstadt
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New York, N. Y.
Dr. Herbert V. Muchnic
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Saginaw, Mich.
Dr. Reuben E. Olson
Wichita, Kansas
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Austin, Texas
Dr. William Adams Pressly
Greensboro, N. C.
Dr. E. B. Pulliam
Corpus Christi, Texas
Dr. Joe Tennyson Reece
New York, N. Y.

Honor Roll of Active Members
American Association of Orthodontists
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Dr. G. F. Wilson
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Col. L. B. Wright

There may be members in the Service whose names do not appear in the above list. These members should notify the secretary at once so that their names may be included.

Max E. Ernst, Secretary, American Association of Orthodontists, 1250 Lowry Medical Arts Bldg., St. Paul, Minn.

In Memoriam

HARRY E. KELSEY

Many orthodontists throughout the land were shocked to learn of the death of Dr. Harry E. Kelsey of Baltimore, Maryland, on Friday, March 1, 1946. Dr. Kelsey, or Harry, as he was familiarly known, died while lunching with Mrs. Kelsey at their home in Baltimore.

Dr. Kelsey, who was well known as an orthodontist and as one of the pioneers of the specialty on the eastern seaboard of the United States, served as lecturer on orthodontics at the Baltimore College of Dental Surgery from 1906 to 1910, at which time he was appointed to a professorship, serving in this capacity until 1923.

In 1913, with the founding of the dental staff at the Johns Hopkins Hospital, he was placed in charge of the Department of Orthodontics. He held that post until his retirement from professional life in 1940, remaining a consultant until his death.

In thirty-two years of practice, Dr. Kelsey treated for tooth irregularities more than 3,000 private patients, including three generations of Baltimore children.

He published 57 articles in the field of orthodontics, and also at various times published over 50 clinical reports.

Dr. Kelsey received many professional honors. He was a member of Omicron Kappa Epsilon, the highest scholarship society in dentistry, he was a former president of the Maryland State Dental Association, and member of the American Association of Orthodontists, the American College of Dentists, the Southern Society of Orthodontists, the Washington-Baltimore Society of Orthodontists, and the American Board of Orthodontics.

In 1940 Dr. Kelsey served as chairman of the committee on international relations for the dental centenary celebration in Baltimore.

He was chairman of the board of trustees of the Clarence J. Grieves library foundation and a member of the executive board of the research commission of the American Dental Association. Dr. Kelsey was a member of the University Club, the Baltimore Country Club, and the Johns Hopkins Club.

Another one of the stalwarts who pioneered in the specialty of orthodontics has passed on to his reward. He was highly regarded as an important link in the early history of the specialty and was one of those who deserves much credit for its advance. The Kelsey influence will be greatly missed in orthodontics.

HERBERT HOPKINS

Herbert Hopkins, one of the first generation of orthodontists to locate in Washington, D. C., died at his home in Chevy Chase, Maryland, after a heart attack on March 19, 1946.

Dr. Hopkins was born in Brooklyn, New York, June 18, 1880, and received his dental training at Harvard Dental School and George Washington University Dental School, from which he was graduated in 1908.

For many years he had offices at 1726 Eye Street, N. W. Dr. Hopkins had formerly been a professor of orthodontics at Georgetown and George Washington Universities.

In addition to heading the District Dental Society, he had also been president of the Southern Society of Orthodontists and was a member of the American Dental Association, the American Society of Orthodontists, the New York Society of Orthodontists, the Washington-Baltimore Society of Orthodontists, and Psi Omega Fraternity.

Surving are his widow, Mrs. Nellie T. Hopkins; two sons, John B. and Herbert C. Hopkins, Jr., and a daughter, Mrs. Helen H. Haywood, all of Washington; three brothers, Dr. Stephen C. Hopkins, a Washington orthodontist, and Kenneth and Arthur Hopkins of Cranford, New Jersey; and a sister, Mrs. Seward, New York City.

Dr. Hopkins will be remembered particularly among the older orthodontists as a hard worker and a man religiously devoted to his specialty. He was handicapped somewhat during the latter part of his life by deafness; however, he carried on, attending meetings and maintaining a keen interest in the specialty and its progress.

He was beloved by his patients, a kindly man whose extreme modesty constituted one of his greatest charms. It was said by Demades that "Modesty is the citadel of beauty and virtue."

Herbert Hopkins will long be remembered as the epitome of kindliness, modesty, and courtesy. Such lives contribute much to the happiness of their fellow men.

Department of Orthodontic Abstracts and Reviews

Edited by

DR. J. A. SALZMANN, NEW YORK CITY

All communications concerning further information about abstracted material and the acceptance of articles or books for consideration in this department should be addressed to Dr. J. A. Salzmann, 654 Madison Avenue, New York City

Principles and Practice of X-Ray Technic and Interpretation. By H. W. Mustermann, D.D.S., Associate Professor of Roentgenology at the New York University College of Dentistry, Lecturer on Dental Radiology at the New York University College of Medicine. With 511 illustrations. Pp. XIV-278. Price $5.00. Brooklyn, Dental Items of Interest Publishing Co., 1945.

This volume is an enlarged and revised edition of the work of the late Dr. A. L. Greenfield. The book includes general considerations of the x-ray apparatus, its construction, operation, and protection of the operator and patient. The technique of taking roentgenograms is covered in detail and profusely illustrated. In each instance the position of the head, the angle of the tube, and the position of the film are summarized.

An interesting chapter is presented on the method of placing the film in the mouth in taking intraoral dental roentgenograms. It is at this point that the success or failure of the roentgenogram is frequently determined. Faulty placement and irritation of tissues make the patient noncooperative and results in poor roentgenograms.

Film processing is presented and includes darkroom construction and procedure, the chemistry of developing and fixing, timing methods and storing. Methods of avoiding various interferences are given, and the basis of examination of roentgenograms is presented, as are normal anatomic landmarks and pathologic conditions.

Osteomyelitis of the Skull. By Major M. T. Schnitker, M.C., U.S.A., and Captain W. D. McCarthy, D.C., U. S. A., Surgery **18**: 94-115, 1945.

Before the introduction of penicillin, osteomyelitis of the frontal bone was regarded as one of the most fatal complications of frontal sinusitis.

In infections of the frontal sinus the offending organism is usually the *Staphylococcus aureus* and occasionally hemolytic streptococcus or pneumococcus. The anterior and posterior walls of the frontal sinus correspond to the outer and inner tables of the skull respectively, so that extension of infection within the sinus up into the diploic spaces of the frontal bone is obviously possible. The diagnosis of osteomyelitis of the frontal bone is made early by evidence of pain and spreading pitting edema of the scalp. X-ray changes are manifested by a "smudge" that is due to the loss of the discrete mucoperiosteal outline of the frontal sinus. Ten days to two weeks following the inception of the disease, demineralization produces the characteristic moth-eaten appearance of the bone, as shown by x-ray, and the diagnosis is no longer in doubt.

The authors report three cases of osteomyelitis of the frontal bone. In all three cases the sulfonamides proved ineffective, and the disease was finally brought under control by the use of penicillin intravenously, orally, and locally. When penicillin was stopped, recrudescence of the disease process occurred in all three patients, and operation, complete removal of the involved portion of the frontal bone through a coronal incision, was necessary in order to effect a cure.

Because of the marked disfiguration resulting from removal of a part of or the entire frontal bone, the patients are usually eager for a plastic correction of the defect.

The authors advise waiting at least three months following the primary operation and complete healing of the wound before completing the secondary plastic repair.

Tantalum, which is highly resistant to corrosion and the chemical attack of body fluids, and, furthermore, has the necessary properties of malleability and ductility to permit a simple technique of fabrication, was chosen as the ideal material for the defects in the frontal bone. The correcting impression material preferred by the authors is the hydrocolloid type because of its accurate reproduction of detail of the defect and the surrounding skull or scalp contour. Dental impression compound or the alginate impression material may be used for smaller defects.

Detailed directions for preparation of the impression material and operative technique are given. The report is enhanced by a series of excellent photographs showing the appearance of the patients before and after the plastic correction has been performed.

Harry A. Salzmann, M.D.

Asymmetry in Tooth Size: A Factor in the Etiology, Diagnosis and Treatment of Malocclusion: By Murray L. Ballard, D.D.S., *Angle Orthod.* **14**: 67-70, July-October, 1944.

Measurements were made of 500 sets of models, drawn from three different private practices and from the Division of Orthodontics, College of Dentistry, University of California. All models were made from plaster of Paris impressions. Fine-pointed dividers were used to determine the greatest mesiodistal diameter of each permanent tooth on the models; the dimensions in millimeters were taken from a finely calibrated millimeter rule and recorded in the data. No deciduous teeth were measured. The greatest mesiodistal diameter of each tooth was compared with that for the tooth of the opposite side, and discrepancies were catalogued as follows:

a. Discrepancies between teeth of opposite sides of one-half millimeter or larger.

b. Discrepancies between teeth of opposite sides as large as one-quarter millimeter but less than one-half millimeter.

Discrepancies less than one-quarter millimeter were disregarded, since they might be attributed to errors of measurement, and in any case would not be clinically significant.

Mean mesiodistal diameters, ranges, and standard deviations were calculated on all teeth to provide an indication of tooth size and variation. These values are compared with ranges and means published by Black.

Individuals who showed right-left discrepancy in mesiodistal diameters of certain teeth were further studied to discover cases which showed no discrepancy with respect to total segment length in spite of left-right discrepancies of teeth within the segment.

TABLE I. ASYMMETRY OF MESIODISTAL WIDTH IN HUMAN TEETH

	NO. OF TEETH MEASURED	NO. CASES WITH DISCREPANCY	PERCENTAGE	DISCREPANCY 0.25-0.50 MM.	PERCENTAGE	DISCREPANCY OF 0.50 MM. OR MORE	PERCENTAGE
			Maxillary Teeth				
Central incisor	999	123	12.3	28	2.8	95	9.5
Lateral incisor	972	178	18.3	39	4.0	139	14.3
Cuspid	868	109	12.5	30	3.4	79	9.1
First bicuspid	914	112	12.2	31	3.3	81	8.8
Second bicuspid	871	114	13.0	28	3.2	86	9.8
First molar	988	144	14.5	24	2.4	120	12.1
			Mandibular Teeth				
Central incisor	988	100	10.1	21	2.2	79	7.9
Lateral incisor	989	117	11.8	35	3.5	82	8.3
Cuspid	912	129	14.1	25	2.7	104	11.4
First bicuspid	906	154	16.9	46	5.0	108	11.9
Second bicuspid	836	97	11.6	24	2.8	73	8.7
First molar	972	129	13.2	28	2.8	101	10.3

The distribution of the cases showing discrepancies was also made with respect to the Angle classification.

That such discrepancies between teeth of opposite sides of the same dental arch are well-nigh universal is demonstrated by the fact that 448 out of the 500 cases measured (90 per cent) showed left-right discrepancy in one or more pairs of teeth. Four hundred eight of these cases showed a difference of 0.5 millimeter or more between left and right teeth. The remaining 40 cases had discrepancies greater than 0.25 millimeter but less than 0.5 millimeter.

The maxillary teeth most frequently involved were the lateral incisors and the first molars; of the mandibular teeth, the cuspids and first bicuspids.

In 448 cases with discrepancies, there were only 72 single arches which showed balance between lateral segments in spite of individual discrepancies.

In any structure, natural or contrived, in which component parts interdigitate in such a definite manner as do the teeth, and where the articulating surfaces are so formed that settling into positions of stability is enhanced, discrepancies of the magnitude of 0.5 millimeter cannot be ignored. It is shown here that conditions inimical to perfect balance of the denture are found in nine patients out of ten, and in the majority of this group of discrepancy, the discrepancy is 0.5 millimeters or more. This means that if ideal contact point relationships are established in both arches and a highly satisfactory arch-to-arch relationship is achieved on one side, the other side may be thrown out by discrepancies in tooth size. Final stability can be attained only through alteration of inclined plane relationships from those considered ideal, or adjustment in arch length through rotations and slipped contact. It is not unlikely that these changes, which frequently occur when treated cases are released from retention, do so because of lack of harmony in tooth material from the outset.

It should not be concluded from this demonstration of disharmony that the orthodontist should forthwith decide that relapse is inevitable. The judicious stripping of proximal surfaces has been practiced by orthodontists in the past and should continue to be good practice. Where lack of harmony in tooth material lies primarily in the anterior segments, more latitude is provided in correcting lack of balance by stripping than in the buccal segments, where inclined plane relationships impose definite limitations. It should be remembered that in the mandibular anterior segment there are ten proximal surfaces which may be stripped to compensate for maxillary incisors which are deficient mesiodistally.

Facial Prosthesis: By Arthur H. Bulbulian, M.S., D.D.S., Director, Museum of Hygiene and Medicine, the Mayo Foundation, Rochester, Minnesota. 202 illustrations. Philadelphia, London, W. B. Saunders Company, 1945.

With the return to civilian life of many former servicemen who have suffered wounds of the face which necessitate prosthetic restoration, the practicing dentist is likely to find himself called upon to construct or repair such appliances. The dentist with his technical skill and experience has already shown special aptitude in designing and constructing artificial parts of the human anatomy, including eyes and limbs, in the Service hospitals of the Armed Forces. With the coming of peace, this knowledge will be useful in servicing these appliances.

Bulbulian is of the opinion that dental schools will soon add courses on facial prosthesis to their curricula, preferably as postgraduate training.

Loss of even a small part of facial tissue, of the nose, cheek, lip, eyelid, or ear, is more serious than loss of large areas in other parts of the body, since it brings about certain psychological as well as economic consequences.

While plastic surgery is to be preferred in the repair of lost soft tissue about the face, there are certain circumstances, such as lack of vascularity, malignancy, extent of area, and expense, which make plastic operations contraindicated and leave prosthetic restoration the only means available.

Bulbulian describes the various materials available for the construction of prosthetic appliances, and their advantages and disadvantages. The principles of impression taking and cast pouring are fully discussed and illustrated. The use of latex and plastics is described, as are additional materials commonly used for prosthetic restorations.

Prescription Writing and Materia Medica for Dentists: By L. Richard Cipes, Ph.G., D.D.S., New York City, Attending Dentist, New York City Department of Health; Attending Dentist, Mt. Vernon, New York, Department of Health; Member Alumni Committee Columbia University, College of Pharmacy; Formerly Instructor in Oral Surgery, New York University College of Dentistry; Director of Dental Research, Montifiore Hospital, New York City. Second Enlarged Edition. Brooklyn, N. Y., Dental Items of Interest Publishing Co., Inc., 1945.

Pharmacology and prescription writing as part of the dental curriculium can be taken as criteria of the importance of the so-called nontechnical subjects in comparison with the mechanical procedures on which the practice of dentistry rests. The dental student goes through the motions of studying certain basic sciences, but little attention is given to their correlation to the demands of actual practice. Cipes has made a valiant attempt in his book to give the practicing dentist knowledge on the action, compounding, and administration of various combinations of drugs.

Included in the second edition of this book are chapters on penicillin and other antibiotics, with special references to their use in dentistry.

It is surprising that Cipes has not included the use of fluorine in dental therapeutics, as a local agent or in community water supplies. This is a serious omission in a book now in its third printing since 1941. The book, nevertheless, contains much which will be found of practical value by the dentist. There are numerous prescriptions on dentifrices and prescriptions for the treatment of oral diseases.

News and Notes

Prize Essay Contest, American Association of Orthodontists

The Research Committee of the American Association of Orthodontists has been empowered by the Board of Directors to conduct a prize essay contest.

Eligibility.—Any student enrolled in a recognized university or any person who has completed his or her formal education in orthodontics not more than three years prior to June 1, 1946, is eligible to compete for the prize.

Essay.—The essay must represent a piece of original research having a direct bearing on the field of orthodontics. It may relate either to a biologic or clinical problem and may represent material that has been offered in partial fulfillment of the requirements of a graduate or postgraduate degree, or any graduate, postgraduate, or undergraduate contest. No papers previously submitted and now published or in press will be accepted for the present contest. All essays must be in the hands of the committee by June 30, 1946. If no essay is deemed worthy by the committee, the prize will be withheld.

Award.—The prize has been set at $200.00; in addition to this, the traveling expenses of the winning essayist to and from the meeting will be paid. The essay will be accorded a place on the scientific program of the annual meeting of the Association at Colorado Springs, Sept. 30, 1946, and the prize will be awarded at this time. The Association will retain publication rights on the first three choices.

For further information, address: ALLAN G. BRODIE, Chairman, Research Committee, A.A.O., 30 North Michigan Avenue, Chicago 2, Ill.

Pacific Coast Society of Orthodontists

CENTRAL SECTION

The Central Section of the Pacific Coast Society of Orthodontists held its regular meeting Dec. 10, 1945, at the Alexander Hamilton Hotel in San Francisco. The guest of the evening was Dr. Spencer Atkinson.

Dr. J. Camp Dean made a report on the forthcoming meeting of the Pacific Coast Society of Orthodontists in San Francisco. Since the American Association of Orthodontists is meeting on Sept. 30, 1946, arrangements have been made for the San Francisco meeting to be held on May 27, 28, and 29, 1946. Hotel accommodations have been made and the Southern Pacific reports that transportation will, at that time, be possible. A resolution on having the meeting at that time was passed unanimously.

Dr. Spencer Atkinson was next introduced by the program chairman, Dr. Vernon Hunt. As usual, the audience enjoyed everything Dr. Atkinson had to say, and he caused everyone to think and to compare Dr. Atkinson's approach with his own. His subject was, "When Orthodontic Treatment Should Be Instituted, and Some Refinements in Orthodontic Mechanisms." The attendance and the questions that were asked of Dr. Atkinson at the conclusion of the meeting spoke well for the group's appreciation of his presence.

SOUTHERN SECTION

The Southern Section of the Pacific Coast Society of Orthodontists held its last quarterly meeting at the Ambassador Hotel in Los Angeles on Dec. 21, 1945.

The passing of Dr. Oppenheim was memorialized in a talk by Dr. Atkinson, who touched upon the highlights of his professional life. His intensive study and exact thinking will have a permanent effect upon orthodontic practice.

The program followed:

"What Train Do You Catch?" A. Entenza, LL.D., Los Angeles, California.

"Endocrinopathies and Their Relation to Orthodontics." Sidney Cross, D.D.S., M.Sc., Graduate Instructor at the College of Dentistry, University of Southern California.

Round Table Discussions of Interesting and Difficult Cases. Table Chairmen: Charles D. Linfesty, D.D.S.; Fred McIntosh, D.D.S.; L. R. Sattler, D.D.S.; C. E. Thompson, D.D.S.

The program chairman, Dallas McCauley, was then introduced, and after discussing the program for the coming year, he introduced the speaker of the evening, Francis M. Pottenger, Jr., M.D., F.A.C.P., who spoke on problems of human health and development, and illustrated with slides the use of roentgenograms of the carpal bones as a developmental index.

Southern Society of Orthodontists

The twenty-second annual meeting of The Southern Society of Orthodontists was held in Charlotte, North Carolina, at Hotel Charlotte, from Sunday afternoon, January 27 through Tuesday afternoon, Jan. 29, 1946. This was one of the best planned, most ably directed and conducted meetings held by our society. More than two hundred were in attendance.

Sunday afternoon at 1:30 P.M., those desiring to play golf met and were conducted to one of the sportiest courses in the South. All Sunday afternoon friends were meeting friends. Many members of the Charlotte dental profession were on hand to take us sightseeing and to show real hospitality with a smile.

At seven o'clock Sunday evening a delectable buffet dinner was given to the orthodontists, their wives, and guests, by the Charlotte Dental Society. Dr. William P. Weeks was our host, as president of the Charlotte Dental Society. The full committee assisting was composed of Dr. Grady L. Ross, Dr. J. Don Kiser, and Dr. L. F. Bumgardner. Dr. Olin Owens, who served as general chairman of the whole meeting, was on hand to see that every detail was carried out.

On Monday morning registration started bright and early. Since we had not met in 1945, we were all feeling "It's been a long, long time." The meeting was called to order promptly at 10:30 and the invocation was given by Dr. Bumgardner's pastor and friend, Dr. Claude U. Broach of St. John's Baptist Church. Charlotte's genial Mayor, H. H. Baxter, extended a sincere welcome. E. W. Patton, our Vice-President, responded to the address of welcome and proved his ability as a raconteur and orator. All servicemen and visitors were then recognized and welcomed by Dr. Amos Bumgardner, our president. Drs. Le Roy Johnson and John Mershon were present to greet us. The reading of minutes, messages, and greetings was done by our efficient and capable Secretary-Treasurer, Dr. Leland T. Daniel. In order to expedite the meeting, President Amos Bumgardner asked permission to go on to the presentation of the subject—"Some Clinical Facts Which Definitely Influence Orthodontic Diagnosis and Prognosis" by one of our boys who "went West" and "made good"—Dr. Hays N. Nance of Pasadena, California.

Dr. Nance's excellent and timely presentation did much to help all understand and mutually agree upon many mooted points. Questions and forum discussion followed Dr. Nance's splendidly presented and illustrated address.

The Monday afternoon session was opened with the reading of a paper written by the late Dr. Floyd E. Gibbin of Buffalo, New York, whose death, last December, shocked and saddened us all. Dr. Gibbin's paper, "Looking Ahead," was read by Dr. Walter T. McFall at Mrs. Gibbin's personal request. We were told of the trends in dentistry and orthodontics and urged to do our own thinking, acting, and serving before we lost the opportunity to do our most and best. Dr. McFall paid tribute to Gibbin and Mrs. Gibbin, and called attention to their magnificent gift and memorial fund to the University of Buffalo Dental School, to help in the field of instruction in orthodontics and preventive dentistry.

Dr. Harold D. Kesling of La Porte, Indiana, next gave a most interesting paper and illustrated lecture on "Co-ordinating the Predetermined Pattern and Tooth Positioner With

Conventional Treatment.'' We had all heard of the splendid original work Dr. Kesling has done and it was a pleasure to have him and his wife with us at this meeting.

For the final two hours of the afternoon program, the following practical and helpful table clinics were presented:

1. ''Some Gadgets Which Have Helped Me.'' Dr. E. W. Patton, Birmingham, Ala.
2. ''A New Method for Quickly Cleaning Orthodontic Appliances by Electrolytic Process.'' Dr. Russell E. Irish, Pittsburgh, Pa.
3. ''Development of the Dental Arches.'' Dr. W. K. Slater, Knoxville, Tenn.
4. ''Transfer Cases.'' Dr. Frank P. Bowyer, Knoxville, Tenn.
5. ''Models of Cases Completed by the Use of the Kesling Tooth Positioner.'' Dr. Harold D. Kesling, La Porte, Ind.
6. ''There Must Be a Simpler Way to Do What Needs to Be Done.'' Dr. Andrew P. Jackson, Philadelphia, Pa.

Monday evening, at seven o'clock, we had a delightful banquet with good food and ''Gay Nineties'' entertainment. Dr. George D. Heaton, Pastor of The Myers Park Baptist Church, spoke to us on ''The Professional Man and His Community Life.'' This was one of the highlights of the meeting.

On Tuesday morning we had our business meeting and the following reports were given: (1) Board of Censors. (2) Report on President's Address, which was given at this morning's session. (3) Necrology Report, memorializing Dr. Carroll Johnson of Memphis, Tennessee, who had died since our last meeting. (4) Educational Committee Report. (5) Research Committee Report. (6) Report of Constitution and By-Laws Committee. (7) Report by Public Relations Committee. (8) Resolutions concerning the American College of Dentists' Committee on Journalism were read and unanimously approved and the whole report adopted as read. (9) A brief report by our delegate to the American Association of Orthodontists.

Drs. Robert S. Curtis of Nashville, Tenn., Dr. F. S. Weber of Memphis, Tenn., Dr. Pryor A. Williams of Birmingham, Ala., Dr. N. C. Leonard of Nashville, Tenn., Dr. R. D. Prosser of Lakeland, Fla., Dr. Wallace B. Standard of Louisville, Ky., and Dr. Prewitt of Lexington, Ky., were all elected to membership in the Southern Society of Orthodontists.

Dr. Andrew Francis Jackson of Philadelphia led the discussion of the papers previously presented. General discussion followed Dr. Jackson's ever-capable observations and remarks. ''Uncle'' John Mershon again made us his debtors and admirers by his words of wisdom and joyous helpfulness.

Dr. Russell E. Irish, who returned to us by special invitation, gave one of the most outstanding papers ever presented before our society on truly sound fundamentals in treatment, entitled ''A Discussion of Treatment Based Primarily on Labio-lingual Therapy.''

Tuesday afternoon was devoted to a clinical presentation of the subject presented by Dr. Hays N. Nance on Monday. Hundreds of triple sets of models before, during, and after treatment were presented: those he felt he had succeeded with; those he realized he had helped but not as much as he might have; finally, those which had not pleased him because he had not done what now he has learned he should have done. We were all better informed and more inspired orthodontists because of Dr. Nance's visit.

The following officers were elected for the next year: Dr. J. E. Brown, Mobile, Ala., President. Dr. Walter T. McFall, Asheville, N. C., Vice-President. Dr. N. J. Leonard, Memphis, Tenn., President-Elect. Dr. Leland T. Daniel, Orlando, Fla., Secretary-Treasurer. Dr. S. D. Gore, New Orleans, La., Dr. E. C. Lunsford, Miami, Fla., and Dr. W. H. Lewis, Petersburg, Va., compose the Board of Censors. Dr. Oren A. Oliver, Nashville, Tenn., was re-elected associate editor of the JOURNAL, and Dr. A. C. Broussard, New Orleans, La., was re-elected delegate to the American Association of Orthodontists.

The next annual meeting will be held when and where the executive committee decides, in order to cooperate with the American Association of Orthodontists and to please the majority of our members.

New York Society of Orthodontists

The New York Society of Orthodontists held its annual meeting on March 4 and 5, 1946, at the Waldorf-Astoria Hotel in New York City.

The program was as follows:

MONDAY

"The Family Factors in Dental Caries." Henry Klein, D.D.S., United States Public Health Service, Washington, D. C.

"Prevention of the Decalcification of Enamel During Orthodontic Treatment." Alexander Sved, D.D.S., New York, N. Y.

"The Reaction of the Pulp to Pressure." M. B. Marcus, D.D.S., Professor of Orthodontics, Temple University, Philadelphia, Pa.

"Surgical Treatment of Deformities of the Jaws." Kurt H. Thoma, D.M.D., Professor of Oral Surgery, Harvard School of Dental Medicine, Boston, Mass.

"Some Orthodontic Problems in Histologic Illumination." Bernard Gottlieb, Director of Oral Pathology and Dental Research, Baylor University, Dallas, Texas.

1. Is it justified to talk about too strong forces in orthodontics?
2. Ankylosis in orthodontics.
3. Apices of orthodontically moved teeth may perforate the bone.
4. Orthodontics and pyorrhea.
5. Continuous active eruption and tooth impaction.

TUESDAY

"Use of the Maxillator in Direct Dentofacial Measurement." J. A. Salzmann, D.D.S., New York, N. Y.

"Psychotherapy in Orthodontics." Clifford Glaser, D.D.S., Buffalo, N. Y.

"Factors of Influence in Producing a Stable Result in the Treatment of Malocclusion." Robert H. W. Strang, D.D.S., Bridgeport, Conn.

"Case Report." Bercu Fischer, D.D.S., New York, N. Y.

"Case Report." William Houghton, D.D.S., Watertown, N. Y.

Exhibition of Treated Cases.

Orthodontic Society of Colombia

On Oct. 25, 1945, La Sociedad Colombiana de Ortodoncia was founded in the city of Bogota, Colombia, under the direction of Professor John Masson Griffin.

According to the statutes approved in the general Assembly on December 14, the Directors for the year 1946-1947 are:

Dr. José Mayoral, President
Dr. Obdulio Mendez, Vice-President
Dr. Marco A. Novoa, Secretary-Treasurer

The Wagner-Murray-Dingell Bill—Is It What You Want?

The full effect of the Wagner-Murray-Dingell bill cannot be measured without examining the actual wording of the sections relating to dental benefits. The following are direct quotations from Title II, Prepaid Personal Health Service Benefits (compulsory health insurance), of the Wagner-Murray-Dingell bill (S1606-HR4730), plus comments thereon:

LAY CONTROL

SEC. 203. (a) "The Surgeon General of the Public Health Service shall perform the duties imposed upon him by this Act, under the supervision and direction of the Federal Security Administrator. . . ."

Comment.—In administering the Act, the Surgeon General will be supervised and directed by a lay administrator.

SEC. 203. (b) "The Surgeon General is hereby authorized and directed to take all necessary and practical steps, not inconsistent with the provisions of this title, to arrange for the availability of the benefits provided under this title and of services and reports required by the Board for administration under this Act."

Comment.—The Social Security Board, composed entirely of laymen, is also given administrative powers under the Act.

SPECIALIST SERVICES

SEC. 205. (e) "Services which shall be deemed to be specialist . . . services . . . shall be those so designated by the Surgeon General, and the practitioners . . . who shall be . . . entitled to the special rates of compensation provided for specialists . . . shall be those so designated by the Surgeon General. . . ."

Comment.—The Surgeon General will decide who may be a specialist and will determine what his fee or salary may be.

PANEL LISTINGS

SEC. 205. (e) "The Surgeon General shall publish and otherwise make known in each local area to individuals entitled to benefit under this title the names of medical and dental practitioners and groups of practitioners who have agreed to furnish services as benefits under this title. . . ."

Comment.—Panel listings of participating practitioners will be published in each community.

METHODS OF PAYMENTS

SEC. 205. (g) "Payments from the Account to general medical and family practitioners or to general dental practitioners, for services under this part, shall be made—

(1) On the basis of fees for services rendered to individuals entitled to benefits, according to a fee schedule;
(2) On a per capita basis, the amount being according to the number of individuals entitled to benefit who are on the practitioner's list;
(3) On a salary basis, whole time or part time; or
(4) On a combination or modification of these bases, as the Surgeon General may approve. . . ."

Comment.—Practitioners may be paid on a fee basis, a per capita basis, or a salary basis, subject to approval by the Surgeon General.

LIMITATION OF PATIENTS

SEC. 205. (j) ". . . the Surgeon General may prescribe maximum limits to the number of potential beneficiaries for whom a practitioner or group of practitioners may undertake to furnish general medical or general dental benefits, and such limits may be nationally uniform or may be adapted to take account of relevant factors. . . ."

Comment.—Practitioners may be limited by the Surgeon General in the number of patients they may serve.

COLLECTIVE RESPONSIBILITY

SEC. 205. (1) "In each local area the provision of general medical or general dental benefit for all individuals entitled to receive such benefit shall be a collective responsibility

of all qualified general medical or family practitioners or of all qualified general dental practitioners, respectively, in the area who have undertaken to furnish such benefit.''

Comment.—A ''collective responsibility'' is placed on all participating dentists which obligates them to provide dental benefits for everyone entitled to benefits in their area.

PAYMENTS BY PATIENTS

SEC. 210. (a) ''The Surgeon General may, after consultation with the Advisory Council and with the approval of the Administrator, determine for any calendar year or part thereof that every individual entitled to general medical, general dental, or home-nursing benefit may be required by the physician, dentist, or nurse furnishing such benefit to pay a fee with respect to the first service or with respect to each service in a period of sickness or course of treatment. . . .''

Comment.—The patient seeking dental benefits may be required to pay a fee for his ''first service'' or ''each service'' in a course of treatment.

DENTAL BENEFITS RESTRICTED

SEC. 210. (b) ''The Surgeon General, having regard for the adequacy of available personnel, may, after consultation with the Advisory Council and with the approval of the Administrator, determine for any calendar year or part thereof that general dental, special dental, or home-nursing benefit shall have such restricted content as the Surgeon General may determine: Provided, That on and after July 1, 1947, the restricted content of general dental or special dental benefit shall include at least (1) examination (including X-ray survey) and diagnosis; (2) prophylaxis; (3) extraction of teeth which are considered by the dentist and an attending physician to be or likely to be injurious to the general health of the individual; and (4) treatment of acute diseases of the teeth, their supporting structures, and adjacent parts, including fractures of the teeth or jaws. . . .''

Comment.—Promised dental benefits are extremely limited in extent and vaguely described. For example, extractions are limited to teeth which a dentist *AND* a physician consider injurious to the general health of the individual. The phrase, ''acute diseases of the teeth'' is meaningless.

This bill is now before Congress. Have you told your Senators and Congressmen what you think of it?

American Dental Association, New Pamphlet

A new pamphlet entitled ''Blue Print for Dental Health,'' in which the compulsory health insurance system proposed by the Wagner-Murray-Dingell bill is compared with the national dental health program of the American Dental Association, is now being distributed free to members of the profession and the general public.

Issuance of the pamphlet, prepared by the Bureau of Public Relations Staff, was timed with the openings of public hearings on the Wagner-Murray-Dingell bill before the Senate Committee on Education and Labor, at Washington, D. C. The pamphlet lists several of the major objections of dentistry to the Wagner compulsory health insurance scheme and the advantages of the American Dental Association legislative program. The pamphlet also includes a verbatim presentation of Principles adopted by the House of Delegates of the American Dental Association.

Every member of the profession should obtain copies of the pamphlet for his friends and patients. Distribution is being made through State and Component Society secretaries. Additional copies may be secured, without charge, from the Bureau of Public Relations, American Dental Association, 222 East Superior Street, Chicago 11, Illinois.

American Dental Association

The majority of the American people do not brush their teeth. Half of them do not even own a toothbrush.

These conclusions about the oral hygiene habits of the citizens of the world's most civilized nation were reported today by Dr. H. Berton McCauley, D.D.S., of Washington, D. C.

In the leading article of the March issue of *The Journal of the American Dental Association,* Dr. McCauley revealed that only 185,300,000 toothbrushes were manufactured in the United States in 1944, the last year for which full statistics are available. Of this total, 78,800,000, or 43 per cent, were distributed directly to the Armed Services, the Red Cross, and export agencies.

The remaining 106 million brushes available for civilians represented a major increase over the 70 million brushes Americans purchased in 1939, the last normal peace year.

"But," wrote Dr. McCauley, "since approximately 220 million would be required to supply with two brushes yearly each person who is more than 2 and less than 60 years of age in the United States, it is evident that, even in the flush of wartime prosperity, the majority of Americans do not use toothbrushes."

Pointing out the importance of oral hygiene and its relation to general health, Dr. McCauley urged adoption of uniform standards of design for the toothbrush as an aid to dental health.

To be effective for cleaning teeth a toothbrush should be compact and simple in design, he said, and should have relatively small, straight-trim bristles. Dentists definitely disfavor motor-driven and novel tooth-cleaning devices, he said.

The professionally-preferred brush, as recommended by leading dentists in a survey conducted by the American Dental Association, should also have a straight handle and tufts of equal length. Sharp-angled handles make manipulation difficult and uneven tufts transmit uneven forces to the teeth and gums, thus promoting soft tissue injury, unnecessary abrasion, and inefficiency, Dr. McCauley pointed out.

While admitting the need of variations to meet individual needs, Dr. McCauley recommended that most adults should use a toothbrush 6½ inches in length with a head 1¼ inches long and ⅜ of an inch wide. It should have two rows of tufts, each 1 inch long, and each containing six tufts, spaced ⅛ inch apart. Each tuft should be ½ inch long. In most cases, stiffness of the bristles should be "hard," he declared.

Slightly smaller brushes of "medium" stiffness were recommended as generally satisfactory for adolescents and for children.

Imports of toothbrushes, 90 per cent of which used to come from Japan, were completely halted with the outbreak of war in 1941. As a result, toothbrush production has become a major American industry with a volume of more than 12½ million dollars a year, three times that of twelve years ago.

Typical of the Americanization of the toothbrush has been the widespread substitution of nylon filaments for hog bristles commonly used prior to World War II. The nylon filaments are more durable and elastic than natural bristles, Dr. McCauley said, but their relative merit as cleaning agents has not been determined.

Orthodontic Directory of the World

As announced in the February issue of the JOURNAL, information is now being compiled for the thirteenth edition of the "Orthodontic Directory of the World." Word has come from the Editor, Dr. Oren A. Oliver, that the information blanks are coming in satisfactorily, but at the present time blanks have not been returned by a number of orthodontists to whom they were sent during the early part of March. In order that the Directory may be as complete and accurate as possible, it is necessary that each orthodontist give his full cooperation by returning the requested information immediately.

If you have entered the practice of orthodontics since the last Directory was published in 1942, and have not received an information blank, one will be sent you immediately upon request. All men recently out of the Armed Services, whose addresses have been changed, are asked to write in for information blanks and to give their correct addresses. A number of letters sent to addresses listed in the 1942 Directory have been returned unclaimed, due to lack of forwarding address; if you have moved to a new location and have not received an information blank, you are requested to write in for one.

Information concerning orthodontists who are now deceased, or who have retired from active practice, would be appreciated in those cases of which the Editor has not heard.

Address all communications to Dr. Oren A. Oliver, Medical Arts Building, Nashville 3, Tennessee.

American Association of Orthodontists

The next meeting of the American Association of Orthodontists will be held at the Broadmoor Hotel, Colorado Springs, Colorado, Sept. 30, Oct. 1, 2 and 3, 1946. Members of the American Dental Association are invited to attend this meeting. Proper credentials should be obtained in advance from the secretary of the American Association of Orthodontists or from the secretary of a constituent society.—MAX E. ERNST, Secretary, 1250 Lowry Medical Arts Bldg., St. Paul 2, Minn.

It has been announced that the Antlers Hotel, in Colorado Springs, Colorado, is in a position to take care of guests for the meeting of the American Association of Orthodontists who may be unable to secure accommodations at the Broadmoor, the headquarters hotel. Reservations should be made quite some time in advance.

American Board of Orthodontics

The 1946 meeting of the American Board of Orthodontics will be held at the Broadmoor Hotel, Colorado Springs, Colorado, Sept. 26, 27, 28, and 29, 1946. Orthodontists who may desire to be certificated by the Board may obtain application blanks from the Secretary, Dr. Bernard G. deVries, 705 Medical Arts Building, Minneapolis 2, Minnesota.

New York Society of Orthodontists

The next meeting of the New York Society of Orthodontists will be held at the Waldorf-Astoria Hotel, New York, on Monday and Tuesday, Nov. 4 and 5, 1946.

Notes of Interest

Carl W. Lattner, B.S., D.D.S., announces his return from military service and the resumption of his practice of exodontics and oral surgery at 519 University Club Building, 607 North Grand Blvd., St. Louis 3, Missouri.

Maynard Edmond Cohen, D.M.D., has returned from military service and resumed practice with Fred Ralph Blumenthal, D.M.D., 1 Raleigh Street, Boston, Massachusetts. Practice limited to orthodontics.

Bernard Krumerman, D.D.S., announces that he has limited his practice to orthodontics as of Jan. 1, 1946, at 1116 Hoe Ave., New York, 59, New York.

John C. Brauer, D.D.S., and William W. Demeritt, D.D.S., announce the opening of their offices in the Pellissier Building, 3780 Wilshire Boulevard, Los Angeles, California. Practice limited to dentistry for children.

Dr. William C. Crenshaw, Jr., returning from military service, announces the opening of his office at 3901 West Pine Boulevard, St. Louis, Missouri, on May 1, 1946. Practice limited to exodontia.

Dr. W. C. Crenshaw, Sr., announces his retirement from the practice of dentistry on April 30, 1946.

George S. Harris, D.D.S., M.S., announces his return from naval service and the resumption of his practice at 1123 David Whitney Building, Detroit, Michigan. Practice limited to orthodontics.

Dr. Leo F. Marré announces the reopening of his office in the Paul Brown Building, 818 Olive Street, St. Louis, Missouri. Practice limited to exodontia, oral surgery, and diagnosis.

Robert A. Harris, Jr., D.D.S., announces his return from naval service and his location at 529 University Club Building, Grand and Washington Avenues, St. Louis 3, Missouri.

OFFICERS OF ORTHODONTIC SOCIETIES*

American Association of Orthodontists

President, Archie B. Brusse - - - - - - - - - - 1558 Humboldt St., Denver, Colo.
President-Elect, Earl G. Jones - - - - - - - - - 185 East State St., Columbus, Ohio
Vice-President, Will G. Sheffer - - - - - - - - Medico-Dental Bldg., San Jose, Calif.
Secretary-Treasurer, Max E. Ernst - - - 1250 Lowry Medical Arts Bldg., St. Paul, Minn.

Central Section of the American Association of Orthodontists

President, Arthur C. Rohde - - - - - - - - 324 E. Washington Ave., Milwaukee, Wis.
Secretary-Treasurer, L. B. Higley - - - - - - - 705 S. Summit St., Iowa City, Iowa

Great Lakes Society of Orthodontists

President, Willard A. Gray - - - - - - - - - Medical Arts Bldg., Rochester, N. Y.
Secretary-Treasurer, C. Edward Martinek - - - - - 661 Fisher Bldg., Detroit, Mich.

New York Society of Orthodontists

President, Glenn H. Whitson - - - - - - - - - - 80 Hanson Pl., Brooklyn, N. Y.
Secretary-Treasurer, Oscar Jacobson - - - - - - - 35 W. 81st St., New York, N. Y.

Pacific Coast Society of Orthodontists

President, J. Camp Dean - - - - - - - - - - - 1624 Franklin St., Oakland, Calif.
Secretary-Treasurer, Earl F. Lussier - - - - - - 450 Sutter St., San Francisco, Calif.

Rocky Mountain Society of Orthodontists

President, Henry F. Hoffman - - - - - - - - - 700 Majestic Bldg., Denver, Colo.
Secretary-Treasurer, George H. Siersma - - - - - 1232 Republic Bldg., Denver, Colo.

Southern Society of Orthodontists

President, J. E. Brown - - - - - - - - - Merchants National Bank Bldg., Mobile, Ala.
Secretary-Treasurer, Leland T. Daniel - - - - - 407-8 Exchange Bldg., Orlando, Fla.

Southwestern Society of Orthodontists

President, Brooks Bell - - - - - - - - - - - Medical Arts Bldg., Dallas, Texas
Secretary-Treasurer, James O. Bailey - - - - - Hamilton Bldg., Wichita Falls, Texas

American Board of Orthodontics

President, Frederic T. Murlless, Jr. - - - - - - - 43 Farmington Ave., Hartford, Conn.
Vice-President, Joseph D. Eby - - - - - - - - - 121 E. 60th St., New York, N. Y.
Secretary, Bernard G. deVries - - - - - - - - Medical Arts Bldg., Minneapolis, Minn.
Treasurer, Oliver W. White - - - - - - - - - 213 David Whitney Bldg., Detroit, Mich.
James D. McCoy - - - - - - - - - 3839 Wilshire Blvd., Los Angeles, Calif.
Claude R. Wood - - - - - - - - - - Medical Arts Bldg., Knoxville, Tenn.
James A. Burrill - - - - - - - - - 25 E. Washington St., Chicago, Ill.

*The Journal will make changes or additions to the above list when notified by the secretary-treasurer of the various societies. In the event societies desire more complete publication of the names of officers, this will be done upon receipt of the names from the secretary-treasurer.

Harvard Society of Orthodontists

President, Francis J. Martin - - - - - - - - - - - - 1074 Centre St., Newton, Mass.
Secretary-Treasurer, Edward I. Silver - - - - - - - - 80 Boylston St., Boston, Mass.

Washington-Baltimore Society of Orthodontists

President, Francis M. Murray - - - - - - 1029 Vermont Ave., N.W., Washington, D. C.
Secretary-Treasurer, William Kress - - - - - - - Medical Arts Bldg., Baltimore, Md.

St. Louis Society of Orthodontists

President, Virgil A. Kimmey - - - - - - - 3722 Washington Ave., St. Louis 8, Mo.
Vice-President, Leo M. Shanley - - - - - - - 7800 Maryland Ave., Clayton 5, Mo.
Secretary-Treasurer, Everett W. Bedell - - - - - 1504 S. Grand Blvd., St. Louis 4, Mo.

Philadelphia Society of Orthodontists

President, Frederick R. Stathers - - - - - - - - - 269 S. 19th St., Philadelphia, Pa.
Vice-President, William B. Jones - - - - - - - - - 255 S. 17th St., Philadelphia 3, Pa.
Secretary-Treasurer, Augustus L. Wright - - - - - 255 S. 17th St., Philadelphia 3, Pa.

Foreign Societies*

British Society for the Study of Orthodontics

President, R. E. Rix - London, England
Secretary, K. E. Pringle - - - - - - - 12, Manchester Square, W. 1, London, England
Treasurer, Harold Chapman - - - - - - 6, Upper Wimpole St., W. 1, London, England

Sociedad de Ortodoncia de Chile

President, Alejandro Manhood - - - - - - - - - - - - - - Avda. B. O'Higgins 878
Vice-President, Arturo Toriello - - - - - - - - - - - - - - Calle Londres 63
Secretary, Rafael Huneeus - - - - - - - - - - - - - - - - Calle Agustinas 1572
Treasurer, Pedro Gandulfo - - - - - - - - - - - - - - - - Calle Londres 63

Sociedad Argentina de Ortodoncia

President, Vicente A. Bertini
Secretary, Ludovico E. Kempter
Treasurer, Edmundo G. Locci

Sociedad Peruana de Ortodoncia

President, Augusto Taiman
Vice-President, Ricardo Salazar
Secretary, Carlos Elbers
Treasurer, Gerardo Calderon

Asociación Méxicana de Ortodoncia

President, Guillermo Gamboa - - - - - - - - - - - - - - - - - - Madero 34-3
Secretary, Rutilio Blanco - - - - - - - - - - - - - - - - - - Donceles 98-209
Treasurer, Carlos M. Paz - - - - - - - - - - - - - - - - - - Av. Insurgentes 72

Sociedad Colombiana de Ortodoncia

President, José Mayoral
Vice-President, Obdulio Mendez
Secretary-Treasurer, Marco A. Novoa

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*The Journal will publish the names of the president and secretary-treasurer of foreign orthodontic societies if the information is sent direct to the editor, 8022 Forsythe, St. Louis 5, Mo., U. S. A.